ENGINEERING NEWS-RECORD

AUGUST 12, 1943

BOMBER BASES IN BRITAIN

First major report by

WALDO G. BOWMAN

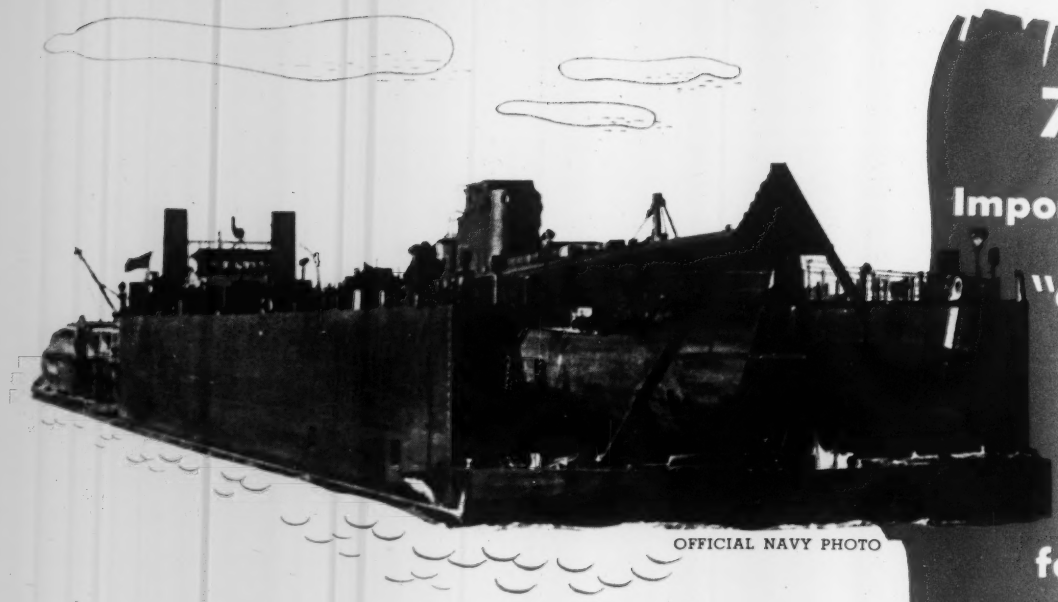
from the European Theatre of Operations

Also in this Issue

BUILDING THE INTER-AMERICAN HIGHWAY, PART II

REFLOATING THE S. S. "NORMANDIE"

LATIN AMERICAN TRANSPORTATION STRATEGY



OFFICIAL NAVY PHOTO

7 Important "defense jobs" here for BYERS WROUGHT IRON

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Developments like this are important engineering news, not just because they indicate how American ingenuity can rise to an emergency, but because of their "swords into plowshares" possibilities. It is interesting to speculate on the use that the heavy construction industry might make of this idea. The salvage and field repair of damaged workboats immediately suggests itself . . . but these drydocks might easily permit revolutionary changes in construction methods, such as large-scale prefabrication in waterfront construction.

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Vol. 131 AUGUST 12, 1943 No. 7

COMING NEXT

• Industrial plant design in wartime, where the proper functioning of highly specialized equipment must be of first consideration, offers both an opportunity and a challenge to the designing engineer. How well this challenge is being met is evidenced by a recent design where the use of 100-ft. span concrete rigid frames, and precast concrete roof slabs spanning 20-ft. bays were employed to provide a fire-proof structure. These and other features will be described in Aug. 26 issue.

• The remodeling of Pittsburgh's Liberty Tunnels, famous as the pioneer in long twin-tube street tunnels, is of historical interest as well as an interesting modernization problem. The work, which involved a new drainage system, roadway slab, tile lining, lighting system, improved approaches, and new carbon monoxide recorders, will be outlined in *ENR* for Aug. 26.

• Large timber arches of 237-ft. span are being erected at a Naval air station for a blimp dock on the west coast. Here the arches are being erected from scaffolds fixed to 18 flatcars, which can be moved from one point of erection to another. A comparison of this method with that used at the Lakehurst, N. J. dock, where twin steel derricks were used to erect similar arches, (*ENR* April 22, 1943, p. 542) will be of interest. See *ENR* for Aug. 26.

LOOKING AHEAD

• Following Waldo G. Bowman's first major report from the European Theatre of Operations—"Bases for Bombing from Britain," which appears in this issue, two articles are scheduled for early publication. They are: "Training Engineer Troops in England"—reviewed on page 87, this issue—and "Military Huts and Structures—An American Installation in Britain." In the latter article Mr. Bowman describes six distinct types of huts and includes aircraft hangars and other structures. It is interesting to note the great difference between these structures and those used for the same purpose at U. S. Military establishments. The reason is explained and much valuable comparative information given.

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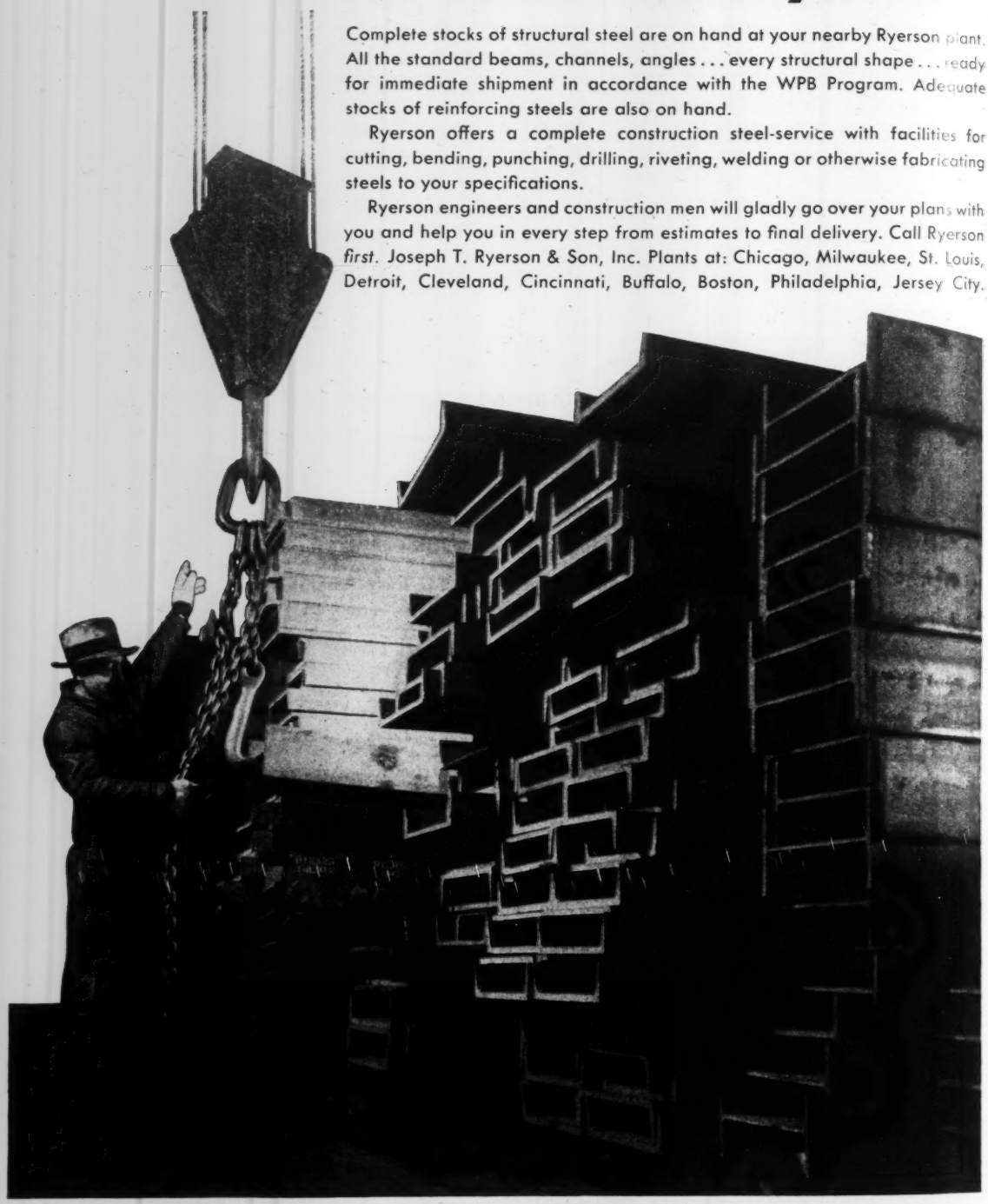


RYERSON STEEL-SERVICE

The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • AUGUST 12, 1943 • VOLUME 131 • NUMBER 7

NLB considers a new plan to settle wage disputes

Private labor problems would be turned over to Wage Adjustment Board of the Department of Labor, which already acts in disagreements on government work.

Secrecy surrounds the details of a plan which the War Labor Board has under consideration for turning private construction wage disputes over to the Wage Adjustment Board of the Department of Labor, which already makes such adjustments for government construction disputes. At present, private disputes are handled by 12 WLB regional offices. It is said that the plan concerns setting up a panel to consist of equal numbers of representatives of contractors and labor, with a disinterested chairman, probably selected by the Secretary of Labor, to make recommendations to the WAB, which would act upon such recommendations. Under the proposed new setup, decisions by the WAB would be subject to review by WLB as is now true in regard to government wage adjustments.

Requests increase

With public construction tapering off, and private construction picking up, WLB is already getting more requests, and expects an increase as priorities become more readily available for private work. Though the two boards deny conflict in the past, it is generally agreed that it is possible for one board to make decisions in any given region which are out of line with those of the other board.

A further argument for handling of disputes by a single board is the obvious one of increased efficiency. Furthermore, the WAB keeps a complete file of wages prevailing all over the country, while the regional boards of the WLB do not keep such information even for their own regions. This causes delay because of the necessity of holding hearings to get such data.

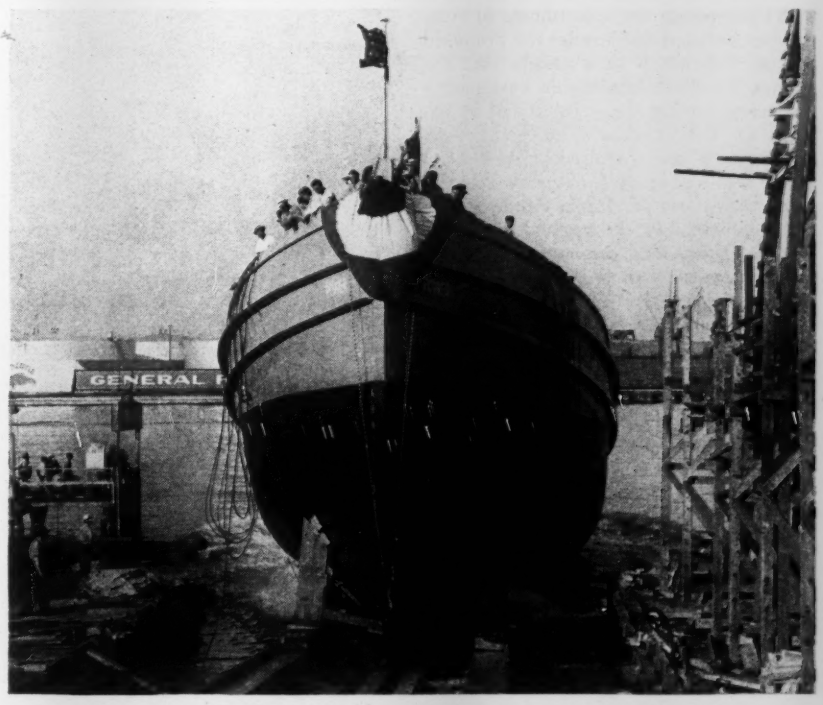
Contractors are interested

Negotiations have been under way for some time between the two boards and the present proposal was submitted by WAB in response to requests from the War Labor Board and the Associated General Contractors. Its provisions were laid before the President at a conference attended by Secretary of Labor Perkins; Assistant Secretary Dan W. Tracy, who is also chairman of the WAB; Herbert Rivers and C. Harry Bates, members of the adjustment board. Rivers is secretary-treasurer of the Building Construction Trades Department of the American Federation of Labor, and Bates is president of the Bricklayers, Masons and Plasterers International Union.

• • •

Finlayson Lake water now diverted to Long Lake

Drainage of water from Finlayson Lake into Long Lake, major part of the operations in connection with Canada's Steep Rock Lake iron development (ENR, Oct. 15, 1942, and April 1, 1943), commenced on Friday, July 23, when a 1500-pound dynamite blast was successfully set off at the outlet of the drainage tunnel between the two lakes. The tunnel, 1,300 feet long, and 12 feet in diameter, was driven to within seven feet of the bed of Long Lake. It was this plug that was removed by the final blast.



All-wood, coal-fired tug launched at Los Angeles

Standard Shipbuilding Corporation of Los Angeles, Calif., launched the first coal burning, steam-driven, wooden, seagoing tug of World War II on July 26.

Christened "Power," the U. S. Maritime Commission tug is 157 ft. in length, has a 32½-ft. beam, contains about 400,000 b. ft. of lumber, and is the largest all-wood tug yet constructed on the Pacific Coast. The vessel was 161 days on the ways, but it is expected that the remaining 15 tugs ordered will be launched in one-third of that time, as the delays incident to new construction have been eliminated.

The corporation began construction of its 25-acre yard on the main channel of the Los Angeles harbor barely nine months ago.

Partial removal of price ceiling on construction

A hearing will be held in Washington Aug. 16 on the proposal of the Office of Price Administration to exclude all construction from the provisions of its Maximum Price Regulation 251 except residential and farm. These types of construction would still be subject to the regulation which requires that maximum prices charged be calculated on the basis of prevailing labor rates as of July, 1942, notwithstanding the fact that wage increases have since been ordered by the Wage Adjustment Board and the War Labor Board.

Dwellings, apartments, dormitories, and all other types of housing would still be subject to the regulation, as would hotels, garages, sheds; farm houses and all other farm structures, including agricultural drainage. Landscaping, well drilling, and demolition and site-clearance projects connected with residential and farm construction would also remain under the regulation, as would construction services and building material installations for commercial property if a part of a hotel, apartment, or other housing unit. Subcontractors as well as prime contractors are effected by the regulation.

Requirements for a certificate of compliance are simplified under the proposed amendment which says merely that the contractor shall furnish his customer a statement saying the price is not in excess of the maximum price allowed. Contractors are required, however, to keep detailed records of every transaction, regardless of size, together with a full statement of the method by which they calculated maximum prices. Such records are to be subject to inspection by OPA representatives.

OPA's proposal to exclude highway and all other types of construction not specifically mentioned comes as a partial pacifier for Price Administrator Brown's failure to keep his promise of last spring to revoke the entire regulation. In the meantime, steps of formal protest asking for revocation, as a preliminary to legal action, have been taken by members of the Associated General Contractors.

• • •

War-facilities program four-fifths completed

More than four-fifths of the government-financed war facilities program was completed by the first of July. Of a $14,582,000,000 program, $12,038,000,000 of work was finished on that date. A year ago the program was but little more than a third complete, and at the beginning of the year it was only 61 percent finished.

Nearest completion are plants to produce finished munitions, such as guns, combat vehicles, aircraft, ships and ammunition. Facilities for producing ammunition and explosives are 95 percent completed.

Though tending to lag a year ago, the work of constructing and equipping plants to produce raw materials has recently been going forward by bounds. The synthetic rubber program was only 3 percent underway a year ago; by the beginning of the year it was 15 percent along, and now is 61 percent finished.

The largest percentage of gain in construction was for plants which are to produce 100-octane gasoline: less than 1 percent along at the beginning of the year, six months later such construction was 39 percent complete. These plants have been granted high preference ratings, and rapid completion of the program is anticipated. In the privately-financed high-octane program even faster progress has been made. Nearly 63 percent of that program had been completed by July 1.

Seven plants, which make up about one-third of the iron and steel program, are being rushed to completion in the hope that they can be in service by the end of this year. Construction of that entire program is now 75 percent done. Construction for expansion in the chemical industries is 90 percent finished.

• • •

Over a million kilowatts produced at Boulder Dam

The power plant at Boulder Dam has been producing over one million kilowatts of power since early in June. The installed capacity of the plant is about 950,000 kw., but by operating the generators at 10 percent overload it has been possible to raise the output by 50,000 kw. The plant began operating late in 1936.

Portable pipe lines take fuel and water to front

Lightweight pipelines with flexible couplings marched with our Army's advance in Africa and Sicily to deliver water and liquid fuels just behind the battle front. This was made possible by use of a 4-in. dia. spiral welded pipe weighing but 90-lb. for a 20-ft. length and connected by simple couplings that can be attached quickly.

The pipe can be laid at the rate of 10 to 30 miles per day by unskilled labor or army personnel. Gasoline powered pumps are installed at 10 mi. intervals and the line can be operated with few trained men. No communication system is necessary because of an automatic cut-off of power and because only one kind of fluid is shipped through each line.

The pipe is laid above the ground and while it is somewhat vulnerable to enemy action it can be quickly repaired. If a pump is destroyed or breaks down the line can continue to operate at 70 percent efficiency.

Details of the line are not released but the 4-in. dia. pipe has a capacity of 6,000 bbl., 252,000 gal. per day. Total weight including all fittings and pumping equipment is about 13 tons per mile and cost of the material, not including transportation or labor of laying, is $3,000 per mile. Ends of the pipe are heavy to accommodate flexible joint couplings. Liquids move through the line at about 2.5 mph. pumping starting as the line starts so that delivery is not delayed.

Engineer units of the Army have been training with this pipe (ENR July 1, 1943, p. 31) for some time. It was developed by Sydney S. Smith (at left in above picture) manager of the products pipe line department of Shell Oil Co., Inc. Mr. Smith's contribution has been highly commended by Brig. Gen. R. F. Fowler, Chief of the Supply Division, U. S. Engineers.

Much of this pipe was assembled for a lend-lease line along the Burma Road but was diverted to other theatres of operation when that road was taken by the enemy. Four such lines for gasoline and water were in use in the African campaign in lengths of 75 to 300 mi.

Construction work to be resumed on Colorado-Big Thompson project

Over 2½ miles of the 13-mile irrigation tunnel through the Continential Divide remains to be driven. Several dams in other parts of the country may be started.

Work will be resumed on the Colorado-Big Thompson diversion project just as soon as sufficient crews can be recruited, said Chief Engineer S. O. Harper of the U. S. Reclamation Bureau at Denver on July 26, following an announcement from Washington that the WPB has rescinded its order which halted work last Dec. 31. The new action was taken at the request of the War Food Administration.

Mr. Harper said that slightly more than 2½ miles remain to be bored in a 13-mile-long tunnel through the Continental Divide, which will link Grand Lake to a watershed of the Big Thompson River near Estes Park.

Other construction authorized by lifting of the WPB order includes the completion of the North Fork diversion dam which will create Shadow Mountain Lake, and the building of a conduit from the east end of the tunnel to the Big Thompson River. Mr. Harper said the project will not furnish irrigation water until the spring of 1945. Approximately 90,000 acre-ft. of water will be available when presently-authorized work is completed. An amount four times greater will be on hand when Granby Reservoir is built, but that construction will not be undertaken until after the war.

The Western North Carolina Flood Control Committee met at Asheville, N. C., July 28, with engineers of the Tennessee Valley Authority and decided to submit the TVA's preliminary engineering report on the upper French Broad River flood control proposal to other North Carolina agencies which would be involved.

The report of the TVA was issued last fall after a survey had been made by engineers at the request of farmers, industrialists and others in western North Carolina who formed the flood control committee after the disastrous floods of August, 1940, which left damage of $2,600,000 in their wake.

Outlined in the report are preliminary engineering plans for a system of detention dams, construction of levees and channel improvements in the French Broad and Swannanoa rivers which would enable the streams to handle a flood 50 percent greater than the one of July, 1916, which caused $4,000,000 worth of damage, most of which was in the city of Asheville.

The Bonneville Power Administration has won agreement of Idaho officials to construction of the proposed Albeni Falls Dam on the Pend Oreille River in north Idaho, said Paul J. Raver, Bonneville director, recently. Raver conferred with Gov. C. A. Bottolfsen of Idaho and other Idaho officials in regard to the state's objections to the project which would increase water storage for Bonneville and Grand Coulee dams on the Columbia River.

Governor Bottolfsen voiced the state's agreement so long as certain restrictions and safeguards are met, as follows:

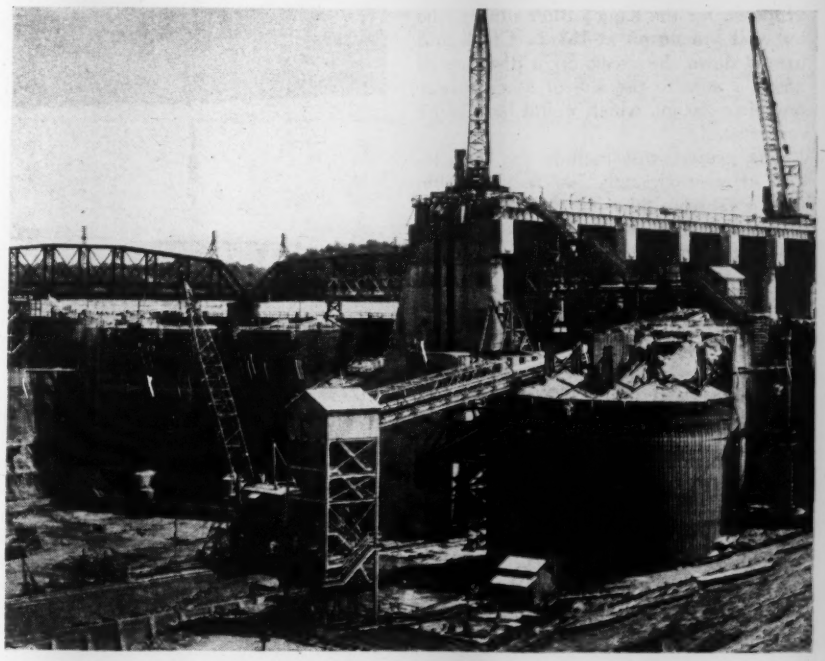
Simultaneous approval by Congress of the Hungry Horse Dam on the south fork of the Flathead River in Montana, the Cabinet Gorge power Dam on the Clark Fork River in Idaho and the Albeni Falls Dam as coordinated development for benefit of Idaho, Montana, and the Bonneville Power Administration, and that the waters in Lake Pend Oreille be raised no higher than El. 2062.5 ft. by construction of the Albeni Falls Dam, which also would provide irrigation of Rathdrum prairie.

The Bonneville administration has now abandoned its plans for raising the level of Flathead Lake to obtain additional water storage for Grand Coulee and Bonneville dams on the Columbia River. This proposition has met with considerable opposition from citizens of both Washington and Idaho.

The Arkansas Flood Control Commission, following the lead of Congressman Fadjo Cravens of Fort Smith, Ark., who proposed that the ban on construction of new dams be lifted, will make an effort to obtain the "green light" on dam construction in the Arkansas valley as a necessary means of protecting food supplies which might suffer from injury to agricultural land by floods.

According to John P. Morrow, Batesville, Ark., chairman of the commission, the first step will be a conference with the Oklahoma Water Resources Board and the congressmen and senators from Oklahoma and Arkansas. This meeting will be held during the congressional recess.

The projects the construction of which the commission is urging are the Fort Gibson and Markham's Ferry dams on the Grand River in Oklahoma; the Bull Shoals Dam on the White River in Arkansas; a dam on the Ouachita River in Arkansas and the Narrows Dam on the Little Missouri River in the state of Arkansas.



TVA's Kentucky Dam near Paducah is rising fast

This mammoth TVA dam near Paducah, Ky., is rising on a "round-the-clock" work schedule. The completed spillway section is shown at the right. At the left is the second-stage cofferdam. The left foreground shows a section of foundation nearly cleaned and ready for concreting. Kentucky Dam's power is needed for future war production. The dam will impound a lake 184 miles long, capable of storing enough water to take more than 2 ft. from flood crests on the Mississippi River south of Cairo, Ill.

Some current municipal water supply problems

The water problem is always one of the greatest that any community has to solve, and it is one that becomes more pressing when for any reason there is a sudden and rapid growth of population. Following are the newest developments in the water supply situation of three typical American municipalities:

Wilmington, N. C.—This city has been bothered with a high salt content in its water supply periodically for the past several years. The situation becomes particularly acute in summer. A rapid growth in population due to war industries and service bases located in the area also has brought to the forefront the need for an adequate water supply.

Plans for laying a pipeline to provide the city with a salt-free water supply have been developed. Original plans called for a pipeline from King's Bluff on the Cape Fear River to Wilmington, but the FWA revised its plans and a considerably shorter pipeline will be laid from the present pumping station at Toomer's Creek to Hood's Creek, a distance of about eight miles. The new pipe line, construction of which is scheduled to start within the next few weeks, will be of 30-in. reinforced concrete pipe and will be along the right-of-way originally proposed for the King's Bluff supply line but will branch off at Hood's Creek and extend down the creek for a distance of about a mile to the site of a temporary pumping station, which would have to be constructed.

The project will include the installation of approximately 700 ft. of flexible joint cast-iron pipe at the Cape Fear River crossing to connect the Hood's Creek pipeline with the city's pumping station at Toomer's Creek.

Denver, Colo.—A corps of 20 engineers will take the field soon, it is said, to complete geological and geophysical studies involved in the 30-million-dollar Blue River water diversion project to augment Denver's water supply.

Plans for the survey have been mapped by officials of the Denver Board of Water Commissioners and engineers of the Federal Reclamation Bureau and the Geological Survey. The 20 men, including T. S. Lovering, geologist for the Interior Department, will conduct core tests of strata and other geological tests in preparation for the locating of reservoirs and tunnels for the huge project. When completed, the diversion is expected to transfer more than 400,000 acre-feet annually of Blue River water into the Platte River above Denver.

Half of the water will go for municipal consumption and half to serve the agricultural lands surrounding the city along the city-owned Highline Canal.

The officials discussed tentative plans drawn by the board to locate reservoirs near Dillon, Colo. They also studied plans to run the diversion tunnel under the Continental Divide from the vicinity of Dillon to a Platte River outlet on the Eastern Slope.

Houston, Tex.—A special division of the city utilities department to be known as the San Jacinto River division, was created by the city council on July 21, and a $180,000 appropriation from water department surplus funds was voted, to begin work on the city's water improvement program.

The appropriation will finance the setting up of a special engineering staff for the remainder of this year, and the preparation of plans and designs for the proposed San Jacinto River dam and reservoir and a 100-acre dam site, new water wells west of the city, and improvements to the distribution system. Little, if any, construction work will be started this year, it was indicated.

The funds were appropriated from the water department's surplus which now totals around $800,000, and which has been accumulating for a number of years in anticipation of a water improvement program.

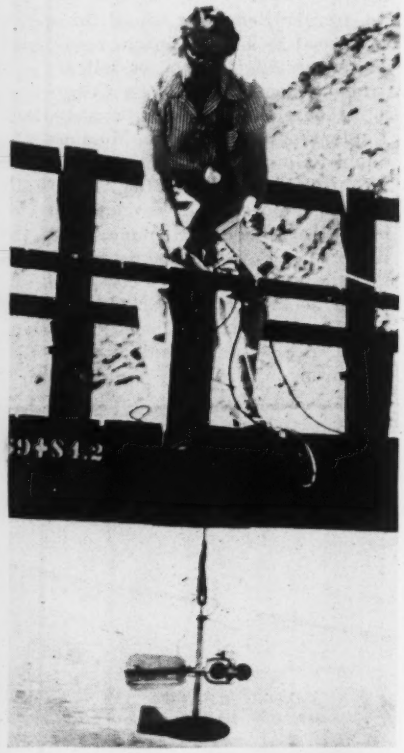
The program which is now getting under way consists of the development of the San Jacinto River as a surface water source; extension of the present underground source through the addition of more wells west of the city; and renovation of the distribution system.

On the recommendation of Utilities Director J. M. Nagle, the council agreed to retain W. W. Horner, St. Louis consulting engineer, as a consultant on a per diem basis as the program progresses. Mr. Horner and his Houston associate, Henry E. Elrod, recently completed an exhaustive survey of Houston's water needs and the means to meet them, and recommended the program which has now been adopted and started by the council.

Louisville, Ky.—A proposed lowering of the underground level in the industrial area was the subject of a recent conference attended by Governor Keen Johnson, Mayor Wilson W. Wyatt, Glenn L. Parker, head of the water resources branch of the U. S. Geological Survey, and large industrial water users. Conservation of the underground water basin was recommended by Lucian Beckner, chairman of a special committee. With J. E. Ulrich, engineer of the War Production Board, Mr. Beckner has compiled data and points out that the question of groundwater should be separated from that of the city's water system which uses Ohio River water.

The extent of the underground water basin in Louisville is not known, but current use is at the rate of 100,000,000 gal. daily, as compared with 75,000,000 gal. daily pumped by the city water system.

Two large water mains are being constructed by the Defense Plant Corporation to supply war defense plants. One is 60 in. in dia. and the other 48 in.



A woman hydrographer

When Gladys M. Jewett was a little girl she helped her father by reading the gages on his irrigation ditches in Round Valley, Calif. Her reports were the essence of simplicity—the creek waters were either "going up" or "coming down."

Today Mrs. Jewett is Los Angeles' first woman employee whose duties include current meter measurements and hydrographic studies. Since March she has been employed in the Independence office of the Aqueduct Hydrography division, replacing an employee now in Uncle Sam's service.

Every day she compiles and checks the aqueduct report which includes over a hundred individual gage heights, discharges, elevations, temperatures, weather records and barometer readings at stations extending from Mono Basin to Dry Canyon. She is doing a good job of it, too, according to her associates.

Notes from THE YUKON

By H. W. Richardson
Western Editor, Engineering News-Record

WHITEHORSE, YUKON TERRITORY
July 18, 1943.

My last report mentioned that I was just starting on a 32-mile trek by horseback through the impassable section of road from White River to Beaver Creek in the western Yukon. That was quite a trip. Two Utah Construction Co. men, an Indian packer and I started off with two extra packhorses loaded with grub and duffle. At the end of 8 hours steady going we had covered only half the distance but men and horses were both willing to call it a day. We camped in the open to get away from the mosquitos as much as possible, throwing our bed rolls on the ground. A net over my head simply made it a little harder for those Yukon bombers to get at me, but they got inside some way. In the morning there were scores of the critters inside the net, all gorged with my favorite blood. The Red Cross might as well have had that quart.

Getting the road back in service

The second day was a repetition of the first—weary hours of plodding through muskeg, often nearly belly deep on the horses. Utah Construction has a whale of a job ahead of them to get that road back into service, but long stretches of well-graveled sections that stood the spring thaws will help a lot.

Spent the night at the Army's Beaver Creek camp, where the bears are so friendly they are a nuisance, and started on for Alaska the next day in a big Studebaker truck driven by a lieutenant. An army doctor went with us and before long all three of us were shoveling deep mud trying to extricate the truck from a mud hole. After wasting 960,000 ft.-lb. of energy and 3,643,437 cu.ft. of breath cussing, we found we didn't have the front wheel drive in gear. A shift of a lever and we crawled right out of that swamp.

Rain causes much trouble

Hitch-hiked my way to Tok Junction, where the Alaskan section managing contractors, Lytle & Green, have their new headquarters just above the first crossing of the Tanana River. Found Orville Crawley and C. C. Coykendall in fairly good humor and Coykendall offered to drive me to Fairbanks the next day. Got as far as the Johnson River, where we were blocked by a bridge out. Coykendall went back, and after two days I got through to Fairbanks.

Rains, rains and more rains, the like of which sourdoughs and natives all swear they have never seen, are raising havoc with the road and construction operations. Temporary bridges go out in a flash with disconcerting regularity, gullies are washed out of fresh grades as fast as they are filled. But the job will be whipped this season except for some of the permanent bridges. Experience alone can cope with drainage and run-off problems, but the boys are learning fast. Rivers and creeks up here certainly have their own peculiarities.

Side trip to Skagway

Hopped from Fairbanks back to Whitehorse by plane, and then rode a freight to Skagway over the narrow gage. A boat trip to Haines, site of the old historic Chilkoot Barracks, put me at the south end of the Haines cutoff road that taps the Alcan near Kluane Lake. Foley Bros., M. C., and Rohl-Connolly Co. are building this section, and are having plenty of trouble with rock, high water and soft ground. Dave Daley is on the job, and he and Earl Neville are smashing through all obstacles. This section of the road will be just about tops in scenery for the whole Alcan system.

North of Whitehorse, reconstruction of sections of the Alcan Highway that did not survive the spring break-up is under way. Construction work on the connection to Haines also is being pushed.

Back to Skagway just in time to join Gen. O'Connor and Frederic A. Delano riding the W. P. & Y. R.'s one and only private car to Whitehorse. Found it more comfortable than a caboose on freight train.

No more Alcan!

No more Alcan! Henceforth, says the War Department, the road will be called the Alaska Military Highway. No mere ukase can erase the name Alcan from the minds of the thousands of soldiers and civilians who built it or from the minds of scores of thousands of American and Canadian citizens who were thrilled by the accomplishment of its construction. "The Canadians object to the ugly word." Perhaps some of our northern neighbors object, but the ones here have no such objection. As a contraction of Alaska-Canada the name Alcan stretches over both countries the same as the road. Ugly? Not to the boys who fought mud and muskeg, cold and rain. Alcan is more than the name of a road; it is symbolic of an engineering triumph. It will always be Alcan!

Off to Alaska

Leaving in the morning with Mr. Delano by plane for Anchorage to take a look at construction in that part of Alaska.

• • •

Work starts at Edmonton on large new airport

A contract for the construction of one of the largest airports in North America to be located near Edmonton, B. C., has been awarded to the Coast Construction Co., Ltd., of Vancouver. The contract amounts to approximately 6½ million dollars. Of this 4½ million will be spent on a new airport at Namao, just outside of Edmonton, and 2 million on improvements and extensions to the present airport in Edmonton. Officials of the construction company say that considerable heavy machinery is already on its way to Edmonton from Vancouver, and that work has already started.

Edmonton is on the main air route to Alaska and to Siberia.

The new airfield when completed will rate in size and importance with the great Goose Bay airport in Newfoundland. Orders have already been placed with the National Selective Service to obtain building trade workmen to build runways, hangars and other structures.

JOBS OF THE WEEK

HOUSING, Pennsylvania
Fred J. Brotherton, Inc., Hackensack, N. J., has been awarded a contract for 250 family dwellings by Public Housing Authority, New York, N. Y. The estimated cost is $590,728. Lovelace & Spillman, Bethlehem, Pa., are the architects.

HOUSING, New Jersey
Daniel J. Cronin, Inc., Newark, N. J., will construct buildings in Hudson County for U. S. Engineers, New York, N. Y., at an estimated cost of $500,000.

ROAD AND BRIDGES, Idaho
Bureau of Highways, State of Idaho, Boise, opened bids on July 30 for constructing road bed, drainage structures, nine log bridges on 16.059 miles of the McCall-Stibnite Road from Lick Creek Summit to South Fork of Salmon River, Valley County. Colonial Construction Co., Spokane, Wash., was the lowest bidder at $687,396.

BUILDINGS, Alberta
Coast Construction Co., Ltd., Vancouver, B. C., will construct buildings for the U. S. Government, Washington, D. C. The estimated cost is $4,500,000.

AIRPORT, Grand Forks, N. D.
Butler Construction Co., Grand Forks, N. D., has been awarded the contract by the Civil Aeronautics Administration, Chicago, Ill., for improving airport. The estimated cost is $530,375.

IMPROVEMENTS, Iowa
Bureau of Yards & Docks, Navy Dept., Washington, D. C., awarded a contract for improvements to McCarthy Improvement Co., Davenport, Ia. The estimated cost is $666,636.

AIRPORT, Mason City, Ia.
Civil Aeronautics Authority, Kansas City, Mo., will construct bituminous paving runways, at airport. The contract has been awarded to A. T. Nolan Co. and McCree & Co., Minneapolis, Minn., at $502,450.

HOUSING, Nebraska
Paul Steenburg Construction Co., St. Paul, Minn., has been awarded a contract by the Public Housing Authority, Kansas City, Mo. The estimated cost is $700,000. Davis & Wilson, Lincoln, Neb., are the architects.

IMPROVEMENTS, Texas
U. S. Engineers, Denison, received the lowest bid from Texas Bitulithic Co., Dallas, for improvements in Dallas County at $742,000.

HOSTELS, Malton, Ont.
Russell Construction Co., Ltd., Toronto, Ont., has been awarded a contract for two hostels by Wartime Housing, Ltd., Toronto, Ont. The estimated cost is from $700,000 to $800,000.

ROADS, California
J. A. Casson and N. M. Bell & Sons, Berkeley, were the lowest bidders for grading and paving a road between the city limits of Vallejo and Suscol Creek, in Solano and Napa Counties, at $642,100. State Division of Highways, Sacramento, opened bids. G. T. McCoy, Sacramento, is the state highway engineer.

Note—Additional bidding and contract news on many projects large and small appear in the Construction News section beginning on page 76.

To free Pennsylvania's remaining toll bridges

Governor E. Martin of Pennsylvania is considering the revival of the State Bridge and Tunnel Commission to push the freeing of Pennsylvania's 12 remaining toll bridges. Nothing has been done on this matter since 1933 when a referendum was passed authorizing the floating of a $10,000,000 bond issue for the state purchase of these bridges.

It is expected that new members of the commission will be appointed shortly in place of those who never functioned.

High school boys repair city streets in Illinois

Repair and maintenance of streets in Springfield, Ill., is being successfully accomplished by a cooperative action between high school officials and the city engineer in which all common labor on several miles of patching and resurfacing streets has been done by about 40 boys. As reported by the Public Administration Clearing House, Chicago, many of the youths took the jobs as a means of training for athletic competition or for military service.

Chicago filtration plant gets needed priorities

Completion of Chicago's new south side filtration plant within the next year appears probable, according to Oscar E. Hewitt, commissioner of public works, inasmuch as Mayor Kelly was notified Aug. 3 by Donald M. Nelson, chairman of the War Production Board, that WPB has granted Chicago the necessary priorities for machinery and equipment to complete the plant.

Building contracts for constructing the pumping station and the superstructure of the chemical building at the plant located on the Lake Michigan shore at 79th St. was let May 12 (*ENR* May 27, p. 779), with the contract being awarded on July 14 to the low bidder, S. N. Nielson Co., Chicago. Now that the necessary priorities are assured, says Commissioner Hewitt, contracts will be let for installation of an estimated $250,000 of equipment and machinery needed to complete the filtration plant.

Completion of the sedimentation and chemical buildings comprising the plant will remove about 70 percent of the pollution now found in the lake water in the vicinity of the Dunne Crib, off 67th St., according to city engineers. Thus the threat of an epidemic from polluted water will be removed around the end of next summer. No action has been taken, meanwhile, on the city's request to the federal authorities for permission to increase the diversion of lake water into the Sanitary Canal as a means of safeguarding the health of the city's south side residents.

• • •

New superintendent of Wyoming state highways

J. G. Smith, of Cheyenne, was appointed superintendent of the Wyoming state highway department, July 28, at a meeting of the highway commission to fill the vacancy created by the death of C. F. Seifried (ENR, July 29, p. 184).

Mr. Smith's knowledge of highway construction and maintenance throughout the state was obtained over a period of 22 years in the Wyoming highway department during which he advanced progressively from the position of resident engineer to that of division engineer. When it became evident that the war would restrict highway construction, Mr. Smith obtained a leave of absence from the department early in 1942 and accepted a position with the A. H. Read Construction Co., Cheyenne, where he was employed until his new appointment.

Mr. Smith is a native of Tennessee. He attended the University of Tennessee and Tri-State College of Engineering at Angola, Ind., where he received his B.S. in C.E. in 1920.

OBITUARY

George R. Byrne, 82, retired civil engineer and the first county engineer of Westchester County, N. Y., in 1904, when construction of the Bronx valley sewer was undertaken, died Aug. 7 at Purchase, N. Y.

For three decades Mr. Byrne was a member of the White Plains, N. Y., civil engineering firm of Byrne & Darling until fifteen years ago. He served as village engineer of White Plains in 1914 and 1915.

Cornelius C. Vermeule, Jr., 47, former director of the Public Works Administration in New Jersey died Aug. 7. Mr. Vermeule was a graduate of Princeton, 1920. He had directed many outstanding construction projects throughout the state. He was a captain in World War I and was decorated for bravery in the Meuse-Argonne, St. Mihiel and Somme drives.

William Higginson, 76, architect and engineer, who retired several years ago as senior member of the firm of William Higginson & Son, New York, died Aug. 4.

Mr. Higginson was born in London and came to this country at the age of 17. With Henry C. Turner he planned and designed the Robert Gair Company Building in Brooklyn, said to be one of the first reinforced concrete structures in this country. It was built in 1900.

He was the designer of some of the largest industrial plants in the United States, among them the Bush Terminal in Brooklyn, the Loose Wiles Biscuit Company buildings in Long Island City.

Wilmer H. Reinecke, 59, an engineer for the Wisconsin Bridge & Iron Co. for 20 years, and later sales representative for steel products, died in Milwaukee, July 31.

George Burgess Carey, 74, owner of the Southern Amiesite Asphalt Co., Birmingham, Ala., died at Lexington, Ky., July 27. Mr. Carey was recognized as one of the leading authorities on highway and street construction in the South.

Benjamin M. Oliver, 72, superintendent of roads for Sumter county, S. C., died at Sumter July 27.

CONTRACTS AND CAPITAL

CIVIL ENGINEERING construction volume in continental U. S. totals $31,773,000 for the week. This volume, not including the construction by military combat engineers, American contracts outside the country, and shipbuilding, is 33 percent lower than in the preceding week, and 84 percent below the total for the corresponding 1942 week. Private construction is 47 percent lower than a week ago, and 69 percent below a year ago. Public work declines 31 percent from last week, and is 85 percent lower than in the period last year according to the *ENR* construction statistics.

The current week's volume brings 1943 construction to $2,141,802,000, an average of $66,931,000 for each of the 32 weeks. On the weekly average basis, 1943 construction volume is 66 percent lower than the $6,471,393,000 for the 33-week period last year. Private construction, $264,897,000, is 35 percent lower than in 1942, and public work, $1,876,905,000, is down 68 percent when adjusted for the difference in the number of weeks.

In the classified construction groups, gains over last week are in waterworks, bridges, industrial buildings, earthwork and drainage, and streets and roads. All classes of work are below their respective totals of a year ago.

New capital for construction purposes for the week totals $3,185,000, an increase of 212 percent over the total for the corresponding 1942 week. The current total is made up entirely of state and municipal bond sales.

New construction financing for the 32 weeks of 1943, $2,924,770,000, is 68 percent below the $9,509,648,000 for the 33-week period a year ago.

CONTRACTS
Continental U. S. Only
(Thousand of dollars)

	Week Ending Aug. 13 1942	Aug. 5 1943	Aug. 12 1943
Federal	$182,967	$38,049	$23,781
State & Municipal	6,744	3,110	4,613
Total public	$189,711	$41,159	$28,394
Total private	10,889	6,330	3,379
TOTAL	$200,600	$47,489	$31,773
Cumulative 1943 (32 weeks)			$2,141,802
Cumulative 1942 (33 weeks)			$6,471,393

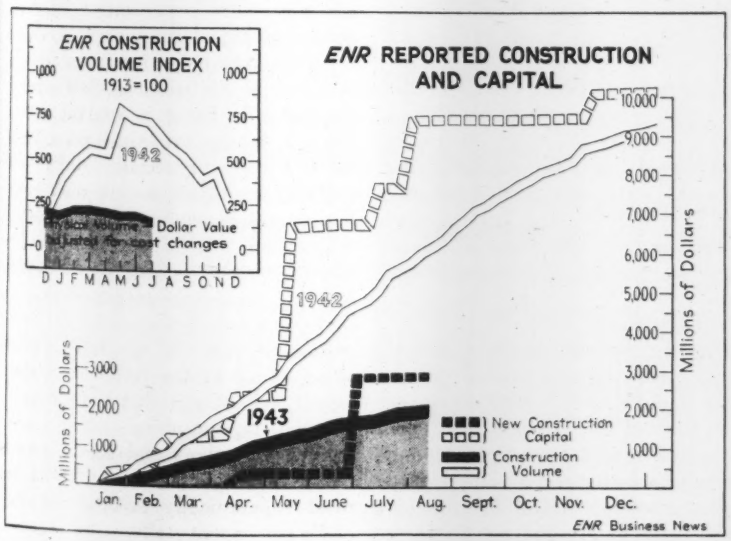
Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

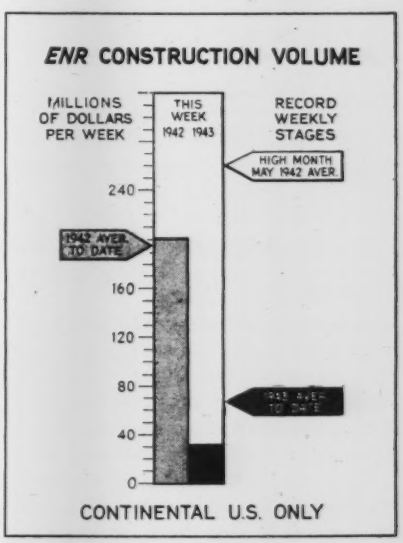
NEW PRODUCTIVE CAPITAL

	Cumulative 1942 33 weeks	1943 32 weeks
NON-FEDERAL	$542,750	$270,932
Corp. Securities	163,849	15,321
State & Mun.	167,782	95,478
R.F.C. loans	128,419	9,000
FPHA loans	.....	3,133
R.E.A. loans	.....	20,000
Fed.-Aid Hwy.	82,700	128,000
FEDERAL	$8,966,898	$2,653,838
TOTAL CAPITAL	$9,509,648	$2,924,770

ENR INDEX NUMBERS

Index Base=100		1913	1926
Construction Cost	Aug. '43	291.38	140.07
Building Cost	Aug. '43	228.49	123.51
Volume	July '43	175	77


ENR CONSTRUCTION VOLUME INDEX
1913=100
1942
Dollar Value adjusted for cost changes
D J F M A M J J A S O N D
ENR REPORTED CONSTRUCTION AND CAPITAL
1942
1943
Millions of Dollars
New Construction Capital
Construction Volume
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
ENR Business News



Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Farming-Out City Work

Sir: As an engineer for 25 years in city service, allow me to give my views on your editorial of July 15, p. 131, in the matter of "farming-out" public works projects.

Civil service engineers and architects have never been averse to the retention by municipalities of consultants for purely advisory purposes, and all legislation introduced by them has stressed that fact.

In the matter of design organization, civil service can expand just as quickly and more efficiently than can the office of the private practitioner. Men on "preferred lists" can be certified while the plans are still in the study stage. The recently established "transfer-loan" policy enables an active department to borrow men from another department without infringing on the seniority rights of the men presently in its employ. The private practitioner must set up his personnel in a helter-skelter manner, pay the present high prevailing wages, table space, and train the new men according to his standards. This is minimized to a great degree in civil service, and the wages paid are certainly lower than on the outside.

In the matter of speed of design production. This is a matter of administrative control. Civil service design can be time-limited just as in the case of "farmed-out" work. The trouble lies in the fact that liberties are taken with the civil service designer in the matter of extensive revisions which no private firm would tolerate unless generously compensated. These changes are for the betterment of design and lower *maintenance costs*, but they do add up into a sizeable design charge. The private designer is not likely to cheapen construction cost since it would lower his commission earnings, and he sticks to tried and true methods for fear that any departure might react unfavorably upon his reputation.

You say that public works contracts would keep private practitioners in business so that their services can be called upon by smaller communities. What is this?—a subsidized WPA! The profession should be able to stand on its own feet. Incidentally, many large cities in this country and others, as well as smaller communities have often retained prominent consultants to solve their problems.

In the matter of "peak load" expansion. Does not the private firm expand over night—and deflate just as quickly? A "level-line" technical organization is desirable, but this can be better attained by the non-filling of vacancies, retirements and the "transfer-loan" policy, rather than by hiring outside firms and their hiring and firing procedure whereby an employee makes $5,000 a year some weeks and sells apples the next! Civil service is continually attracting men in former employ who have become tired of being banged around from one office to another.

In the matter of cost of design. Strictly on cost of design, three separate reports, that of a New York State department chief engineer, the report of a New York City commissioner of accounts, and that of a leading professor of Columbia University, all attest that civil service design is cheaper by far. Of course, "small fry" jobs where the engineering costs oft times are as great as the contract costs, are not considered.

My idea of an "engineer" or an "architect" is "one who plans the design"; the man who "designs the plan" is an engineer or architect in a limited sense. In many instances where work is "farmed-out", the planning of the design, the research work, the surveys, the studies, and the preliminary sketches, all these are done by civil service—and then taken over lock, stock and barrel by the outside firms.

Recently, the cost allocated to conferences between the private practitioner and the civil-service employee who planned the design has been recognized as quite considerable, and is being back-charged by one department against the private firm.

The plans of Mr. Private Engineer must be checked by civil service—and this costs more than if the plans had been designed by the municipal employees. Especially so when it is noted that the average private practitioner has a tendency to "overdesign," either in strength, or in "gingerbread" requirements, or else in uncalled-for costly materials.

No, I say, the "farmed-out" fee is no criterion as to the ultimate cost to the taxpayer.

And finally! Civil Service design makes full use of the data and experience of all city departments, whereas most of the private offices zealously guard any knowledge they have acquired. Outside plans are not as exact or distinct, many contractors say—a matter which conduces to construction disputes, extra-work orders and difficulty in adjudication of claims. This is the inevitable result of the "profit" system under which the private firm must work.

I do not think that you have established a case for the "farming-out" practice which is being protested in the lawsuit initiated by the Civil Service Technical Guild.

LOUIS J. RUBENSTEIN
Brooklyn, N. Y.

Sir: In your issue of July 15, p. 131, in an editorial discussion on "Farming-out City Engineering," you give what purport to be two basic objections to limiting public work to civil service employees.

This organization has in the past litigated the propriety of farming-out public work in specific violation of law; however not this organization nor any other organization of civil service technical employees of which we have knowledge has ever striven to "limit public work to civil service employees". There is general agreement among the organizations of New York City's engineering staffs that private practitioners not only may but should be employed by the city where such practitioners are specialists in specific fields. We maintain however, that such services should be limited to consulting service as "consulting service" is generally understood in all of the technical professions. We submit that the preparation of topographical surveys and engineering plans and specifications etc. are routine tasks which can be most economically executed by the city's permanent staffs.

You state that one of the alleged "basic objections" to the execution of public work by public engineering staffs is "that it tends to increase costs of public work . . .". The opposite is the case. Are you not aware that in determining the cost of engineering of municipal projects which are farmed-out at the usual fee to the private architect or engineer there is added approximately an equal sum to cover the cost of preliminary work, checking and supervision—all very necessary in municipal projects.

Let us keep the record clear. The issue involved in the present discussion and litigation on farming-out as well as that in the past applies, strictly speaking, only to New York City and to the remainder of the state only by theoretical extension. It is unfair to make this an issue which could conceivably "have a disastrous effect on small cities and towns with very limited engineering staffs". It is precisely because New York City's staffs are so extensive and capable of handling all of the normal problems of our city that civil service employees are and have been litigating this issue.

LEWIS J. SKLAR
Chairman, Public Works Committee, New York Civil Service Chapter 23, Federation of Architects, Engineers, Chemists and Technicians.

The question as to whether engineering costs more or less when done by outside consulting firms is only a side issue. The Civil Service Technical Guild is attempting to have New York City ordered to stop farming-out part of its engineering and architectural work on the ground that this farming-out of work violates the civil service provisions of the state constitution. If the courts hold that New York City is violating the constitution, then every city, large or small will violate the constitution by hiring outside consultants, regardless of whether they have one civil service employee or one thousand. That seems too obvious for argument; you cannot shade violation of the constitution. Also, if hiring an engineer to make a plan is a violation of the state constitution, then hiring one to advise as to how the plan should be made (to which practice spokesmen for the guild say they have no objection) obviously must be in violation of the constitution. The constitution makes no distinction between brain work and manual work.

This is the only issue before the Court. Our reason for discussing the side issues was because the guild, in its petition to the court raised such of them as appeared to give weight to its argument.—THE EDITORS.

New Word Needed

Sir: In reference to the suggestion, in your editorial, July 29, p. 188, for a word that would be appropriate to describe duplicate single-piece wood members, completely prepared for use in place, why not use the common descriptive term "prepared," such as "prepared rib," "prepared ring connector." This term connotes "being made ready" for a particular purpose, and covers all the acts of processing, not included in the other terms suggested.

B. C. HAMPTON.
Washington, D. C.

Sir: With reference to editorial "New Word Needed," our organization follows the old time practice once applied to steel.

a. Milling
b. Fabrication
c. Erection

We desire also to submit the word "framing" as a designation for the shaping and sizing of timbers prior to erection. That term is used by one of our organizations composed mainly of timber men.

G. W. MAXON,
President, Maxon Construction Co., Dayton, Ohio

Sir: In your editorial of July 29, "New Word Needed" you are asking for suggestions of a word, that exactly fits the operations done on a single piece of wood in a plant for processing timber.

In my opinion the correct word would be "Preshaping," because the chief purpose of operations is to give the timber a shape, which will exactly fit into a series of shapes, together forming the desired structure. The boring, notching, grooving, etc. operations are necessary to give the piece of timber the required shape, according to the designer's exact dimensions.

CHARLES J. KORNAY,
New York

Sir: In reading your July 29 issue I became interested in the editorial entitled "New World Needed." After giving some thought to the matter, the term "Prefixt" came to my mind as being a good usable trade term—the dictionary spelling being prefixed. In going over various definitions of words which could be used to satisfy the category, this seemed the simplest to me and I believe covers the condition.

AMANDA ENGSTROM
Chicago, Illinois

Beam Method of Design

Sir: In the article, "Beam-Method of Design for Eccentrically-Loaded Columns," by Odd Albert (*ENR*, Mar. 11, 1943), there is given an example of design of a beam (or column) subjected to combined bending and compression, for which it is desired to use tensile steel only and for which given allowable unit stresses are to be developed in the concrete and steel.

In the example referred to, the required depth of beam was determined by the formula

$$d = \sqrt{\frac{M_s}{Kb}}$$

However, in order to determine the value of M_s, the value of d was apparently first estimated. This is quite unnecessary since, from the geometry of the beam section,

$$M_s = Nt = N\left(e + \frac{d - r'}{2}\right)$$

therefore,

$$d = \sqrt{\frac{N\left(e + \frac{d - r'}{2}\right)}{Kb}}$$

from which we get

$$d^2 - \frac{Nd}{2Kb} = \frac{N(2e - r')}{2Kb}$$

Substituting, $N = 24{,}000$ lb., $e = 26$ in., $r' = 2$ in., $b = 12$ in., $K = 131.3$ and solving, we find

$$d = 23.7 \text{ in.}$$

as compared with 22.1 in. given in the example.

Also, by substituting in formula (15) $M_s = Nt$, the formula becomes

$$A_s = \frac{N}{f_s}\left[\frac{t}{jd} - 1\right]$$

or

$$A_s = \frac{24{,}000}{20{,}990}\left(\frac{36.85}{0.875 \times 23.7} - 1\right)$$
$$= 0.935 \text{ sq. in.}$$

It is noted that solution of the equation for A_s as set up in the example cited will give 0.97 sq. in. instead of 1.97 sq. in. as stated.

W. M. BORGWARDT,
Little Rock, Ark.

EDITORIALS

VOLUME 131 NUMBER 7

August 12, 1943

Bases in England

THE FIRST DETAILED ACCOUNT of what American engineers are doing in England is given in this issue in Waldo Bowman's description of the building of bases from which bombers of the American Air Forces now are attacking Europe. It is a record that makes one realize how important it is to train our military engineer units under conditions approaching as closely as possible the conditions to be met in Europe when invasion of the continent comes. Noteworthy is the way in which recently developed knowledge of soil mechanics is being applied to the stabilization of subbases for runways, especially the fact that common practices here are not wholly applicable in England—and presumably in Europe—because of quite different climatic conditions. It is experiences like this that rise to confound the armchair strategists who would land hastily trained forces on European shores. When our engineers land they will not be handicapped by lack of training.

New Enterprise in an Old Field

CONSTRUCTION MEN have watched with much interest the increasing number of construction firms going into shipbuilding. A few large firms went into such work early in the war days, the most spectacular being the Kaiser organizations. Others followed as the nation's shipbuilding program expanded and war construction declined. Last week two more large firms, Turner Construction Co. and Spencer, White & Prentis, announced their association with the Alabama Dry Dock and Shipbuilding Co. in an expansion of that company's operations. In this connection it is worth noting that the versatility that makes it possible for these firms to step over into the shipbuilding field in such an emergency is the direct outgrowth of the contract system of doing construction work. That system has made it possible to maintain organizations of builders whose collective skills reach beyond the capacity of any one individual. As a consequence, organizations with a widely varied experience are available to supplement the overloaded shipbuilders. That they are bringing new skills and a new approach to shipbuilding already is evident. Production rates have been pushed far beyond the most optimistic predictions made when the war shipbuilding program was inaugurated. It is a record of which both the old and new shipbuilders may well be proud.

Engineering Advancement and the War

AS PART OF THE WAR PROGRAM, plain concrete, brick and timber have been rediscovered and are being put to many uses long forgotten by modern builders as well as to some entirely new uses. In this issue a description of sewage treatment tanks built of brick is a good example of how one of our oldest building materials has been employed in new ways that have been made possible by careful engineering study. Saving large amounts of critical war materials like steel has been one of the greatest advantages in these new uses, but others also have resulted, such as greatly reduced formwork in the cases of the brick tanks. Because of these advantages, continued use of these old materials in many new ways appears probable after the war. Similarly, the higher stresses called for in designs that are made as part of the war program may be retained after the war, thus further affecting design methods in the postwar period. Consequently, it may be that engineers will look back upon the war as a milestone along the road of engineering advancement.

Mississippi Flood Control

WHEN A PROMINENT ENGINEER takes to daydreaming the charitable treatment to give to his dreams under most circumstances is to ignore them. That seemed to be the proper treatment to accord to T. Kennard Thomson's 15-year old scheme for controlling floods in the lower Mississippi when he dusted it off and presented it at a meeting in New York recently. But for reasons that are not clear, unless it was the continued heat, the *New York Times* reproduced Mr. Thomson's scheme in its Sunday issue of June 27 and then *Newsweek* devoted nearly a page of its July 12 issue to an amplification of the *Times* report based on an interview with Mr. Thomson. Briefly, Mr. Thomson proposes to dig three new rivers, one taking off part of the flow of the Ohio above Cincinnati and running south to Mobile Bay, a second leaving the Missouri at Kansas City and running south to the Gulf near Beaumont, Texas, and a third from the Niobrara River in western Nebraska south through through Colorado and Texas to the Gulf near

Corpus Christi. One need no great knowledge of geography to recognize that a channel from the Ohio to Mobile Bay would require cuts hundreds of feet deep through the mountains of Kentucky and Tennessee; an elementary knowledge of topography will indicate that such a channel would completely upset the drainage systems of thousands of square miles; and a little exploration into the hydrology of the Mississippi basin will show that great floods still could occur in the lower Mississippi valley after Mr. Thomson's three rivers had been dug. In view of the publicity given to this scheme it seems necessary to put on public record the fact that it is wholly without merit.

Still at High Levels

DURING THE FIRST SIX MONTHS of 1943 construction continued at a high level compared to the long time averages. Except for 1941 and 1942, the total for the six-month period was higher than for all years since 1930. Civil engineering construction reported by *Engineering News-Record* for the continental United States stands at $1,766,000,000, which is more than the half-year figure for 1939 and the whole year 1934, though 63 percent below last year's record-breaking total. And these figures do not tell the whole story. The government has some very large undertakings of a secret nature for which no cost figures can be included in published statistics.

The half-year total of reportable statistics is well below predictions for 1943, most estimates having set the 1943 figure at about 35 percent below 1942. So far, the construction industry appears not to have suffered as much as the 63 percent decline would indicate as probable. That is due in large part to the carry over of 1942 work, including more than half of government's raw-materials facilities program. Other factors are the shift of construction men many into the shipbuilding field, the large number going into construction units of the Army and Navy and the secret undertakings. Also, a large amount of our construction has shifted overseas—for which work we have no statistics in dollars and cents.

What of the second half of the year? The few indicators that are available appear reasonably favorable, but there are elements of uncertainty. New contracts for government work continue at a fairly high rate. They include some new war plants and changes or additions to existing plants, hospitals, some camp work, airfields, access roads, and a fairly large amount of housing. Worth special note is the relaxation of restrictions on western land-reclamation projects. This is the first important lowering of the bars against non-war construction. Unless the shortage of labor in war plants becomes more acute, relaxation of restrictions on highway work and on railway work would appear to be next on the list. Whether relaxation of restrictions on highway and railway work will come in time to have much effect in 1943 cannot be predicted.

Cooperation in Advancement

RECORDS OF ENGINEERS like John W. Alvord who have risen to positions of leadership in their chosen field of activity should emphasize for the young engineer the importance of active participation in the work of technical and professional societies. At the time of his death, Mr. Alvord had been a member of the American Society of Civil Engineers for 50 years; he had participated in the cooperative work of his special field through membership in the American Water Works Association, and had had a share in the engineering activities of his home community by participation in affairs of the Western Society of Engineers.

Membership in a technical society offers an engineers a good opportunity to keep in touch with the investigations and opinions of leaders in his chosen field of specialization, thereby supplementing his own knowledge by the experience of others. Such membership also provides opportunity to gain knowledge of developments in closely related fields of engineering.

Membership alone will not get an engineer anywhere; he must be a worker as well. In his younger days, his work will be chiefly that of a student, but as he grows older he will be able to contribute of his research or experience. Unless those who are marking up progress in engineering do participate in this way, technical societies can be of little service to the profession. Only by each individual doing his part can there be advancement adequate to keep pace with the developments that are rapidly changing engineering horizons. It is essential that engineers pledge their wholehearted support to their profession and take a more active part in its technical and professional societies.

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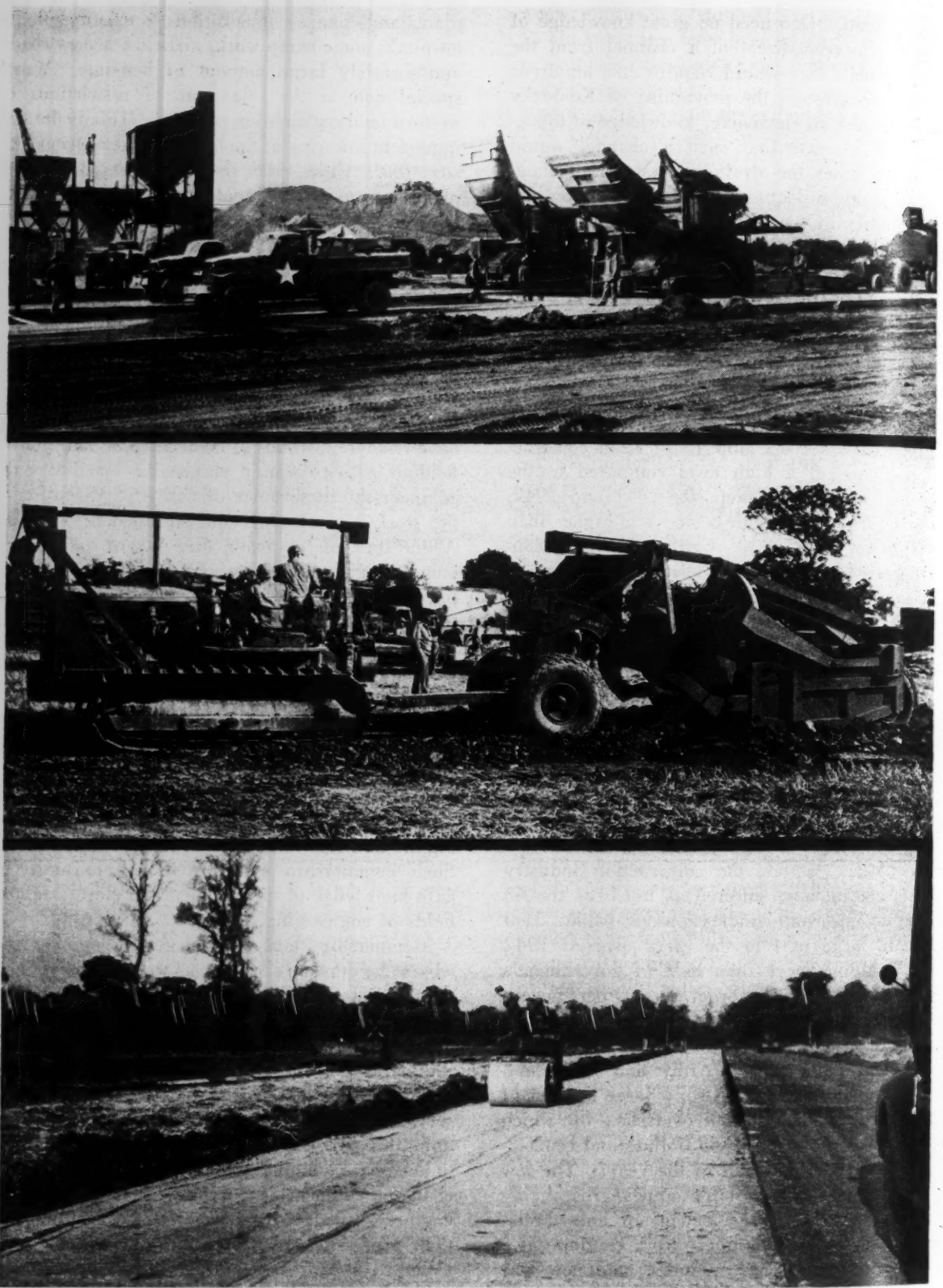


Fig. 1. These three views of construction operations on bomber bases that American engineer troops are building in Great Britain indicate how well those troops are equipped. The upper view shows two pavers passing the batching plant on one base; below, topsoil is being stripped from a future runway, and in the bottom picture, a subbase is being compacted.

ENGINEERING ABROAD AS SEEN BY ENR EDITORS

Bases for Bombing from Britain

Waldo G. Bowman
Editor, Engineering News-Record
(By air mail from the European Theatre of Operations)

***Contents in Brief**—U. S. airbases are being built in large numbers in Great Britain under the construction supervision of our Corps of Engineers. Designs are basically British, modified to fit our special needs. Runways, taxi tracks and hardstandings are of concrete. Hangers and other buildings are of steel, precast concrete or brick. Difficulties are experienced with the soil and with the concrete aggregate that are available. Soil stabilization and asphalt surfacing are being considered. More than half of the bases are being built by British contractors, the remainder by American Engineer troops. Using the most modern American equipment, these troops are not only completing each of the three to five million dollar jobs in record time, but they are gaining valuable construction experience for repeating the process in Europe.*

OFFICERS AND MEN of the Corps of Engineers are building dozens of bases in Great Britain for U. S. bombers that have German addresses on their bomb racks. The construction operations have a double-barreled kick, for they not only produce needed airdromes, but they furnish American engineer units with valuable training in the use of equipment and methods that will stand them in good stead when the Air Forces need bases in Europe. Considerably less than half the airdromes, however, are being built by engineer troops, the remainder being handled by British civilian contractors. British airdrome design also prevails, since the fields must be usable by the R.A.F., but some modifications are being made to suit the needs of our own Air Forces. The British furnish all materials.

There is one further fact that serves to define the type and scope of the program: about half of the projects consist of enlargements of existing British fields, while the remainder are entirely new. Some of the existing fields have grass landing strips unsuitable for bomber operations, so that these enlargement jobs may require the construction of concrete runways, new perimeter tracks or taxi tracks, hardstandings and hutments, and perhaps extensive revamping of the storm drainage, and sewerage and water supply systems. On the new fields, of course, there are the additional problems of clearing, grading, access roads and living quarters construction. British contractors are handling both types of jobs, but engineer troops, in the main, are building only the entirely new fields, since they afford experience in the full round of construction operations incident to airdrome development.

Typical layout and structures

All of the American fields in Britain follow the same general pattern as to layout and, in large measure, as to structures used. Transport fields have special hangar requirements, and fighter runways are shorter than for bombers, but broadly it is only varying topography that causes deviation from the standard. A typical bomber airdrome, as sketched in Fig. 2 will serve to show what this standard is. It would represent a three to five million dollar construction job in the United States.

There are usually three intersecting concrete runways, one of 6,000 ft. and two of 4,200 ft. All are 150 ft. wide, and the slab is uniformly 8 in. thick, and unreinforced. Premoulded expansion joints, 8 in. deep, divide the pavement into sections 20 ft. wide and 60 ft. long, while contraction joints, only 4 in. deep, break the surface at 30-ft. intervals. Clearing of trees and other obstructions is required for 600 ft. either side of the main runway centerline and for 400 ft. either side on the shorter runways.

The same design of slab, as in the runways, is used for the taxi tracks and hardstandings, which, however, are only 50 ft. wide. Taxi tracks encircle the field, giving access to the ends of the runways from all hardstanding dispersal points as well as passing alongside the plane servicing area.

New type of hardstanding

A feature of the taxi track is a new type of hardstanding that forms an integral part of its design. Known as a "loop" standing (or sometimes as a "spectacle" standing because of a slight resemblance to a pair of eyeglasses) it may be used singly or in continuous groups of two, three or more. A half loop may also be used, where topography requires it, but such an arrangement is a "one-way" street for a plane, whereas a full loop permits it to go either way on the taxi track from its dispersal point. Several arrangements of loop standings are shown on the typical airfield in Fig. 2. The significance of the loop standing is that it is really just a widened place in the perimeter track, and is thus economical of land, grad-

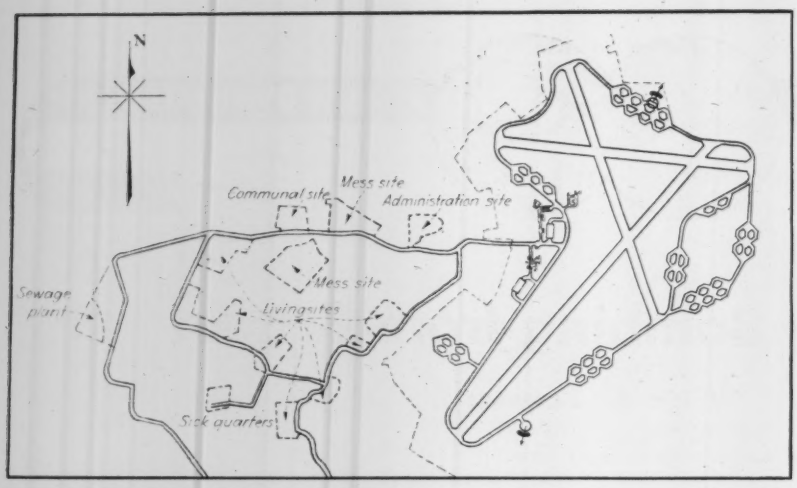


Fig. 2. Typical layout of the airdomes being built by the A.A.F. in Great Britain. Runways, taxi tracks and hardstandings are concrete. Construction of three runways is standard practice at these airdromes, but the number of hardstanding is varied to suit operating conditions.

ing and construction materials as compared with its predecessor the "frying pan," which consisted of a circular slab connected to the perimeter track by an access road. Another advantage of the loop is that its rectangular slab construction is easier to form than the circular slab of the "frying pan." One "frying pan" is shown in Fig. 2.

Preferred type of hardstanding

Some details of loop hardstandings are shown in Fig. 3. In general, the large single loop, which affords maximum dispersal, is less preferred than the basic type, which consists of two smaller half loops each side of the taxi track. As will be noted, the loop track is the same width as the taxi track, i.e., 50 ft. except at the plane parking point where it is increased to 70 ft. All curves are of 120-ft. radius, and the maximum permissable gradient or crossfall is limited to 1 on 40, except at the dispersal point where it is further reduced to 1 on 80. A two-loop (four half-loops) standing of this type represents a considerable grading and paving job, the total area involved being about five acres.

The other detail shown in Fig. 3 relates to the use of a loop standing to give access to a shooting-in butt. At least one such butt is a part of every airdrome, its purpose being to afford the plane crews a spot where they can test their guns. The butt itself is an earthfill (a muck job in Britain terminology) of trapezoidal cross section, with the dimensions shown and about 24 ft. high. It contains 8,000 cu.yd. of earth, and need only be of the roughest kind of construction, except for a 2 ft. depth in from the face, which should be free of stones to prevent bullets from ricochetting.

Altogether, the pavement on a typical airdrome totals from 40 to 50 miles of 20-ft. wide slab, and in terms of cubic yards of concrete from 120,000 to 150,000. This is, of course, the principal element of the installation, but there are, in addition, the hangars, huts and utilities. A future article will be devoted to the structures, so that they need only brief review here.

Steel used extensively

Hangars and huts are most frequently of arched corrugated steel construction, the former reaching 90-ft. span, with only a 20-ft. rise, while the huts, of Nissen type, are generally semi-circles of 16-, 24- or 35-ft. span. Several types of precast concrete huts are also utilized, while the control tower is generally a structural steel frame with brick walls. Brick, in fact, is extensively used for every type of

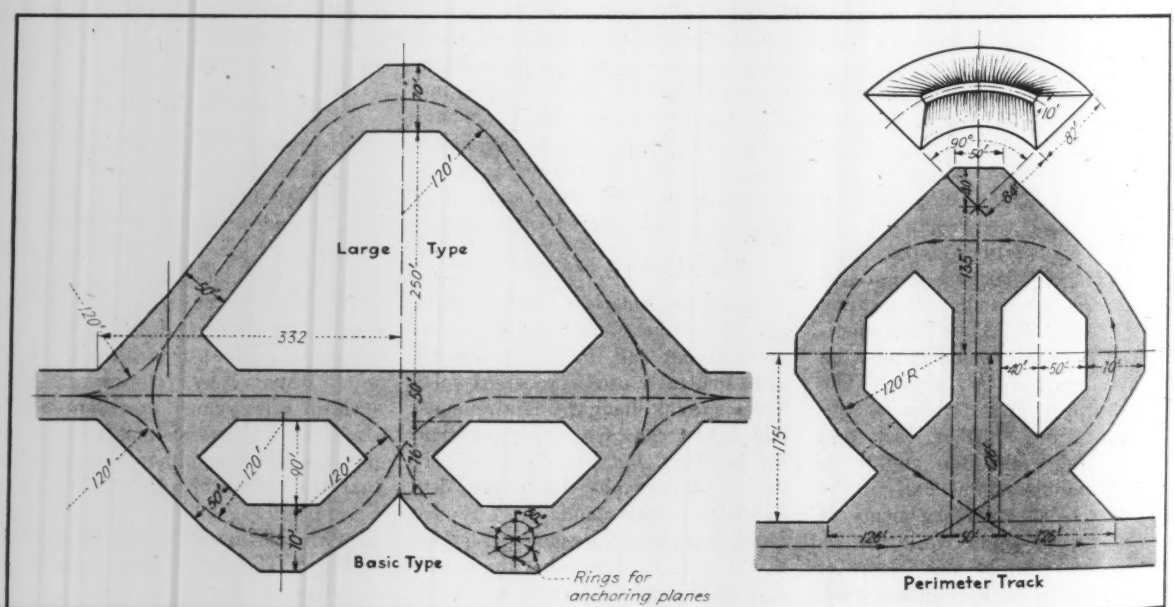


Fig. 3. Layout of loop hardstandings that are typical for airdromes in Britain to be used by A.A.F. heavy bombers.

Fig. 4. Grading and subgrade compaction frequently are part of a continuous operation when the builders encounter the characteristic British "hogging," a pit-run gravel high in sand content.

structure, and the groups of rectangular and circular brick tanks of the sewage treatment plant are particularly striking in appearance. Sewage treatment units include hopper-bottom settling tanks, sludge drying beds, circular trickling filters and final settling tanks, in accord with general practice, which only infrequently utilizes separate sludge digestion and Imhoff tanks. Water is usually piped from a nearby municipal supply to an elevated steel tank which feeds the airdrome mains. As shown in Fig. 2, building sites are numerous and dispersed so that the utility layout is rather extensive.

Airdrome construction

These, then, are the U. S. airdromes in Great Britain, which are being turned over, completed, to our Eighth Air Force to meet the "destruction" schedule that has been laid down for Germany's war machine. How they are being built, the construction methods used and the difficulties overcome is a story of many aspects, but an account of a typical project being handled by one of our engineer troop units can be considered to represent a reasonably adequate description of the program as a whole. Also, it gives evidence of the magnificent job of planning, equipping and training that the Army Engineers have done for their troop units, and of the application of our highly mechanized procedure to British construction conditions.

The first American Engineer troop units moved onto an airdrome construction site last fall. They found a minimum of grading to be done, attesting to the much-praised job of location that British Air Ministry engineers have consistently done for the entire U. S. airdrome program, and they soon encountered British winter mud. With rare exceptions, this is an unwieldly clay, very fine and highly impervious. Disturbed, it becomes slick and sticky, and upon drying out undergoes extreme volume changes. Fortunately there is usually a nearby sand and gravel pit, which contains only about 25 percent of clay and colloidal matter, and advantage is taken of this whenever possible to provide a base for access and construction roads. These were built first, following by camp construction, airfield clearing and grading, erection of materials warehouses and batching equipment, and stockpiling of concrete aggregates.

A variety of equipment

To carry out such assignments, the engineer troop units are supplied with the most modern equipment that American manufacturers have developed. Included on this job were one or more of the following:

Grader, 12-ft. motorized, diesel.
Grader, 12-ft. leaning-wheel, towed.
Ditcher, 24-in. ladder type.

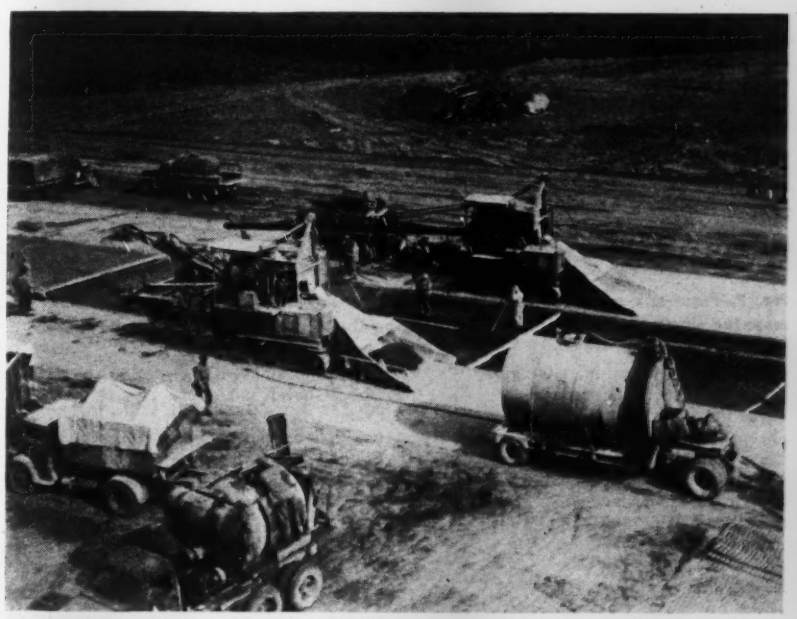


Fig. 5. Using two 34E pavers to pour a 20-ft. pavement strip resulted in such fast progress that batching and finishing operations could not keep up.

Fig. 6. Central mixing plant at the aggregate piles where small batches of concrete originate. The mixer at the far end is of the British continuous mix type.

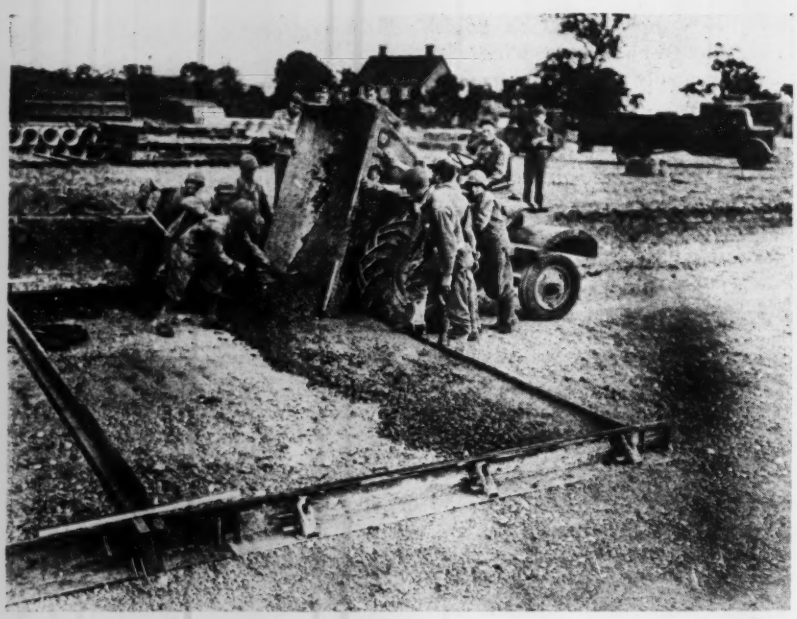


Fig. 7. Plant-mix concrete is transported to a hardstanding in a British tractor-mounted dump body.

Centrifugal pump, 4-in., 100 gpm.
Tandem-roller, 5- to 8-tons.
Three-wheel roller, 10-tons.
Sheepsfoot roller, 2-drum.
Crawler tractor, 80-hp. with angle dozer.
Rubber-tired tractor, 30-hp.
Carrying scraper, 8-cu.yd.
Concrete finishing machine, 20-ft.
Concrete spreader, 20-ft.
Paver, 34E.
Mixer, 14S.
Truck mixers.
Batcher bin, 3-compartment.
Batcher bin, 1-compartment.
Bulk cement batcher.
Gas shovel and crane, ¾-yd.
Diesel shovel and crane, 2-yd.
Crane, truck-mounted, ⅜-yd.
Compressor, portable, 315-cfm.
Flatbed trailer, 8-tons.
Flatbed trailer, 16-tons.

In addition, there were a large number of 1½-ton dump trucks, as well as some British tractor-mounted dump bodies. These engineer-troop-built projects are thus mechanized jobs in the best American manner.

Grading, as pointed out, does not involve large dirt moving operations. Most of the cuts and fills are made with tractor-hauled carrying scrapers, with motorized graders and bulldozers being used to shape the material in the fills. Marshy spots cause the most trouble. A common procedure is to dig out the worst of the material with the scraper and fill the depression with "hardcore," often stone or brick rubble from bombed buildings, which has been nicknamed "blitz brick." This is then covered with cinders to fill the voids and provide a base for the concrete slab.

On one of the airdromes, over 40 unusually bad marshy spots were eliminated in particularly spectacular manner. After the muck had been dug out with a dragline down to solid clay, brick walls, varying in height from 8 to 18 ft. and at right angles to the runway, were built up to the field surface. The compartments so formed were equipped with tile drains in the bottom and filled to the top with pit run gravel. The runway slab was then placed, and reinforced as a beam to carry over this fill and the brick walls.

In general, however, such conditions are the exception and the usual subgrade preparation merely involves a cut of from 12 to 30 in. to stable clay and, under the best circumstances, the backfilling to grade with a layer of pit run gravel or "hogging." Compacted with a 10-ton roller, this provides a fairly good pavement base.

Good aggregates are scarce

Good aggregates for the concrete are not always readily available, with the result that those normally used are the pit run gravels, which in their poorer gradations are known as "hogging," but in the type used for concrete are called "ballast." By our own standards they are "oversanded," contain an excess of clay and are lacking in the intermediate sizes of sand. However, by using an excess of water and cement, a concrete, meeting and often exceeding the specification of a 28-day strength of 2,000 lb., is being turned out. About 8 bags of cement to a 1¼-yd. batch is being used. Specifications also call for a concrete of 2-in. maximum slump, and cone samples are required hourly.

Handling these aggregates at the batching plant has been developed into a fully mechanized operation. The stockpile made by the trucks that

haul the aggregates from the pits, sometimes 15 or 20 miles away, is often a half-acre or more in extent so that bulldozers and carrying scrapers are constantly at work moving the material within reach of a crane which loads the batcher compartments. At most jobs this crane is on the ground, but at one site a crawler crane was placed on top of the aggregate pile, thus increasing its effective radius.

Preparation of concrete

On the job being described here, the batcher plant is placed between two aggregate piles and charged with a truck crane. Trucks back in under the batcher to be loaded, and in moving out pass under another batcher which supplies bulk cement. A third batcher is used to charge truck mixers which are used on this job to supply concrete for building floors and for areas at runway or taxi-track intersections that cannot readily be served by the pavers. On most jobs, however, this type of concrete is supplied by building mixers mounted on a platform set against the aggregate piles. British continuous mixers are also used in the same way. The concrete from such plants is transported in British tractor-mounted dump bodies as shown in Fig. 7.

Runway, taxi-track and hardstanding slabs are placed in 20-ft. widths, using 34E pavers and steel forms. Water is supplied from a trailer-mounted tank pulled by a 6-ton truck which moves alongside the paver. As a typical example of production, a 67-man crew, including 12 truck drivers, averages 900 to 1,000 ft. of 20-ft. pavement in a 10-hr. shift. Two 10-hr. shifts a day are worked, and each man has his week divided into five days on construction, one on military training and one for recreation.

Pavers-worked in tandem

On this job an experiment was tried using two pavers dumping into the same strip, as shown in Fig. 5. They placed 210 ft. an hour, a pace that neither the finishing or batching facilities could cope with. A more typical example, although it is the record so far, relates to an outfit that placed 32 miles of 20-ft. pavement in 90 days, averaging 100 ft. an hour, 18 hr. a day, rain or shine, of which 10 hr. each day was under artificial lights. Such high pressure work is indicative of the enthusiasm with which these engineer troops are tackling the war job that the army has assigned to them.

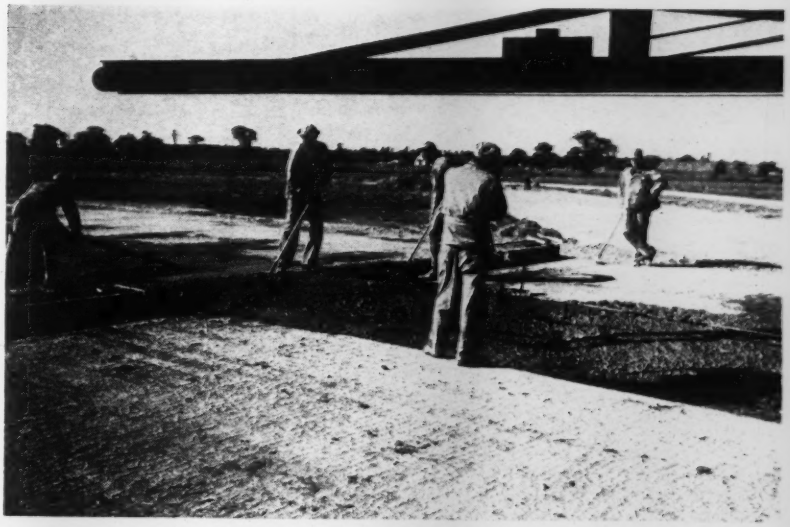


Fig. 8. Filling in a narrow strip of concrete paving in a hardstanding using a box screed of steel channels towed by the paver.

Fig. 9. Placing 10-ft. widths of slab caused finishing difficulties. Here, troops use hand-made screeds and finishing templates.

Because American finishing equipment is usually planned for 20-ft. strips, a minor field problem has been caused by the necessity for building a 10-ft. slab to complete a 150-ft. runway or a 50-ft. taxi track. Some of the runways have been made 140 ft. wide, so that they would contain an even number of 20-ft. strips, but it is now reported that 2½-ft. extensions are being welded to each side of the finishing machines to make them 25 ft. wide. In the meantime, the 10-ft. strips must be built. One outfit made some manually operated screeds and finishers, consisting of an I-beam, with vertical posts containing handles welded to either end. The screed also contained attachments for a cable from a tractor, which pulled the screed as men at either end moved

Fig. 10. Spreading a base of "hardcore" or "blitz brick" for a road. The same material is used for marshy spots under runways. The tractor shown is an old model not owned by the engineer troops.

it transversely. On the job being described here, however, a plate was welded to the mechanical finisher over half its width, so that it could rub harmlessly on the adjacent completed pavement, as the other half finished the 10-ft. slab in normal manner.

All pavement is cured either by covering with straw, which is kept wet for four or five days, or by spraying with an asphalt curing emulsion.

A soil stabilization problem

It is a unique construction program that does not sooner or later develop a major problem or two. The airdrome program in Britain is no exception in this respect, difficulty being experienced in some instances with the subbase. Soil stabilization studies have, therefore, been inaugurated, and several test installations have been constructed in an attempt to develop design specifications and field techniques. The objective is a firm subbase for concrete pavements, but it is also believed that stabilized bases with an asphalt or tar surface may be possible for some service.

The rural roads of the country, during many years of use, perhaps hundreds, have developed traffic-compacted bases that cannot be improved, and since secondary road construction on new alignment is infrequent, there has been no occasion to develop artificially compacted bases in this field. Some successful stabilization has been done on airfields where the soil is sandy and can be mixed with bitumen, but most British soils are of a character that is not easily stabilized. U. S. Army Engineers' studies of stabilization methods for British soils must, therefore, begin from scratch.

Difficulties due to climate

At least two basic conditions cause the problem to differ from similar problems in the United States. The rainfall, although small in annual amount, is so frequent that there is little chance for evaporation; therefore, a soil placed too wet, or one which acquires more than its optimum moisture through rainfall, cannot be dried out by cultivating and compacting it. The second unusual characteristic is the soil itself, which in many respects is not unlike the buckshot soils of the Mississippi Valley, containing 25 to 35 percent of clay and colloidal matter, and subject to extreme volume changes. By American standards, which are based on American methods of compaction, it is unsuited for a base material. The problem is to develop some new technique or treatment that will produce a satisfactorily stabilized base in the face of the climatic conditions that prevail.

So far, three demonstration jobs of stabilized soil have been carried out: (1) some mechanically stabilized roads and hardstandings, using the natural clay-gravel material known as "hogging"; (2) some soil-cement hutment floors and foundations; and (3) a soil-cement hardstanding. In addition, some work has been done with vinsol resin as a stabilizer.

Type of material used

The gradation of the hogging used in the mechanically stabilized job was as follows:

Percent passing 2-in. sieve	95–97.
Percent passing ¾-in. sieve	75–80.
Percent passing ⅜-in. sieve	50–55.
Percent passing No. 4 sieve	30–35.
Percent passing No. 10 sieve	24–28.
Percent passing No. 40 sieve	12–16.
Percent passing No. 200 sieve	5–10.

It is somewhat deficient in the intermediate sizes of sand, a condition which causes it to require somewhat more work for compaction to maximum density than would be the case for a material that is uniformly graded from coarse to fine. However, a density of 135 lb. per cu. ft. and more was attained in the roads. Compaction tests on the portion of the material passing the No. 4 sieve showed a maximum density of 120 lb. and an optimum moisture content of 11 percent. The optimum moisture content of the total material is 5 to 7 percent, but the research showed that moisture in excess of this will be required at the beginning of the compaction process to obtain complete consolidation. It is pointed out that the plasticity of the material is not excessive, and that the binder is of high quality and keeps the surface well bound even in dry weather.

The demonstration job was constructed in a very wet season so that the subgrade could not be effectively compacted. Nevertheless, the hogging when deposited in 3-in. layers or less and compacted by traffic and 8-ton

TRAINING ENGINEER TROOPS IN ENGLAND **This is the subject of a second article, which is to appear in an early issue, by Waldo G. Bowman from the European Theatre of Operations. This story tells how our engineer troops in England are being employed on a variety of construction operations designed to give them valuable experience in working under conditions and with materials simulating those to be found in Europe when the coming invasion of the Continent takes place.**

three-wheel rollers provided a satisfactory surface. It was found, however, that consolidation of the material was slow because there was no evaporation to assist in removing the excess moisture. Provided patience is exercised in consolidating British hogging to its greatest possible density, it was concluded that it will provide a high bearing capacity subgrade for heavy duty pavements and that, treated with a light application of bituminous material to make a dustless surface, a pavement with good resistance to wear of vehicular traffic will result.

The cement stabilization tests were made with a silty clay and a sandy loam. Respective densities were 100 and 113 lb. per cu. ft., and optimum moisture contents 20 and 15 percent.

The silty clay was mixed with 10 percent cement in a pugmill, with the optimum amount of moisture present, and placed in a 4-in. layer on a hut floor, where it was compacted with a gasoline hammer to a 3-in. thickness. Using a 10x10-in. plate on the hammer, a good surface was obtained whereas a smaller plate left the surface uneven. Although a few shrinkage cracks appeared during the first two or three days, the surface remained hard and durable. An attempt to compact a similar 4-in. layer with an 8-ton tandem roller produced a good surface, but did not compact the lower half of the material sufficiently to insure the stability of the mixture.

Soil-cement hardstandings

On the hardstanding, mixing-in-place with 10 percent cement was tried with the sandy loam, scarifiers, disk harrows and cultivators being used, followed by compaction with sheepfoot rollers, and then further harrowing and compacting. Finally, the top surface was compacted with an 8-ton tandem roller and by rubber-tired traffic. Excellent results were obtained.

From these experiments and other tests it has been concluded that cement stabilized soil is practicable in various localities in Britain where airdromes are located, either as a base for concrete pavements, in which case the cement content might be as low as 6 percent, or if concrete aggregates are not economically available as a base for a bituminous surface. The pugmill mixing procedure affords a method of controlling the moisture regardless of the weather, provided there is immediate compaction at the site. Experiments and trial installations are continuing to the end that the U. S. airdromes in Britain will be as durable and as free from maintenance troubles as engineering science can make them.

Fig. 11. A portent of things to come when these engineer troops will be building airdromes behind the invasion forces.

Fig. 1. A large clarifier tank under construction. This tank is 9 ft. 6 in. deep, the limit for single arch construction.

Brick Arches for Tank Walls

Odd Albert
Consulting Engineer, Belmar, N. Y.

***Contents in Brief**—A number of sewage digester and clarifier tanks at eastern army camps have been built with multiple-arch brick walls. Piers between the arches consist of concrete-filled concrete blocks. Tanks vary in size from 50 to 70 ft. in dia. and from 8 to 18 ft. deep, the walls of each being made up of 24 arches. The design saves both reinforcing steel and formwork.*

As a direct result of the need to save critical materials in army sewage plant structures, circular clarifier and digester tanks have been built at a number of eastern camps using walls made up of a series of brick arches. Not only is reinforcing steel entirely eliminated, but no formwork is required as would be the case with conventional circular concrete tanks. To date, 16 brick tanks have been constructed varying in diameter from 50 to 70 ft. and in height from 8 to 18 ft. It is estimated that the use of the brick arch-wall design on these structures has resulted in the saving of 100 tons of steel and 400,000 bd. ft. of form lumber.

To resist the water pressure, the arches are concave inward, but on some of the deeper tanks, against which earth pressures from the outside might be effective when the tanks were empty, a supplemental set of arches that concave outward were also employed to resist earth pressure when the tank is empty. In all cases the piers between the arches are built up of a shell of concrete blocks which serves as a form for a fill of lean cobble concrete.

Steel and formwork saved

The idea of using multiple brick arches for tank walls was orginated by the writer about 10 years ago while employed as promotional engineer for the Brick Manufacturers Association of New York. It was not until last year, however, when working as a consultant for William A. Goff, architect-engineer of Philadelphia, on some conventional concrete tanks at Fort Monmouth, N. J., that he was impressed with the need to develop the brick design in detail so that a substantial saving in steel and formwork could be effected. The first design was made in concrete, which eliminated the reinforcing, but increased rather than reduced the formwork requirements. The brick design was then worked out and accepted for construction by the Corps of Engineers.

A number of difficulties were encountered in the design. One was the fact that in contrast to a bridge arch, in which loads act in a vertical direction, the tank arches are subject to radial loads. Therefore, all ordinary equations for the design of an arch always cancelled out.

It was found that for tanks of about 60 ft. in diameter, 24 arches would give the most economical arrangement. In order to get working equa-

tions, the "method of least work" was used, and artificial movements of the piers, one after the other, were introduced. It was a very slow process, as 24 equations with 25 unknowns were required. The extra unknown was due to the fact that at the starting point, an assumed restraining force had to be used. Then by carrying the design all around the circumference through the 24 supports, the closing restraining value should equalize the assumed restraining force.

Size of arches studied

Another problem was to determine the radii to use in the arches. Here it was found that the center for the outside and inside radius should be the same, so the arches became parts of concentric circles. It was also found that a variation of only a few inches from the value for the radius as determined by the method outlined above would result in failure of the arch. The design of the arches by this system developed arches in which only compression occurred and in which, therefore, no tension steel was required.

Conventional tanks have to be designed not only for pressure from the liquid inside but also to resist outside earth pressure when empty. Such tanks carry reinforcing steel, and there was some doubt whether by omitting this steel in the brick arches they would not become vulnerable to earth pressures from the outside. However, it was found that for these brick tanks, outside earth pressures were not critical for depths up to 7½ ft. This assumption was proved to be correct when the first tank was built and backfilled. In the backfilling, heavy bulldozers were used to pile up and tamp the earth and no cracks occurred in any of the arches. For tanks which are about 12 ft. deep, the outside earth pressures were found to be great enough to require a design utilizing double arches, the outer arch being used to take the earth thrust. In order to take care of the inward thrust on the piers, the tops of all piers were connected to a center column in the tank by heavy timber. These timbers were used to carry the roof deck.

In such construction it is very important that the openings between the arches remain empty.

Application of the design

As an example of one of these tanks, a clarifier tank with an inside diameter of 65 ft. and a depth of 7½ ft. may be cited. The bottom was constructed of concrete 12 in. thick without reinforcement. The walls consist of 24 vertical brick arches 12 in. thick with a span of 6 ft. 5 in. and radii of 7 and 6 ft. (Fig. 4). These arches are supported by buttresses designed to take the outward thrust, the buttresses being built up of an outside shell of concrete block and brick and the core filled with a very lean concrete. The brick arches were designed to be two hinged and were therefore statically indeterminate.

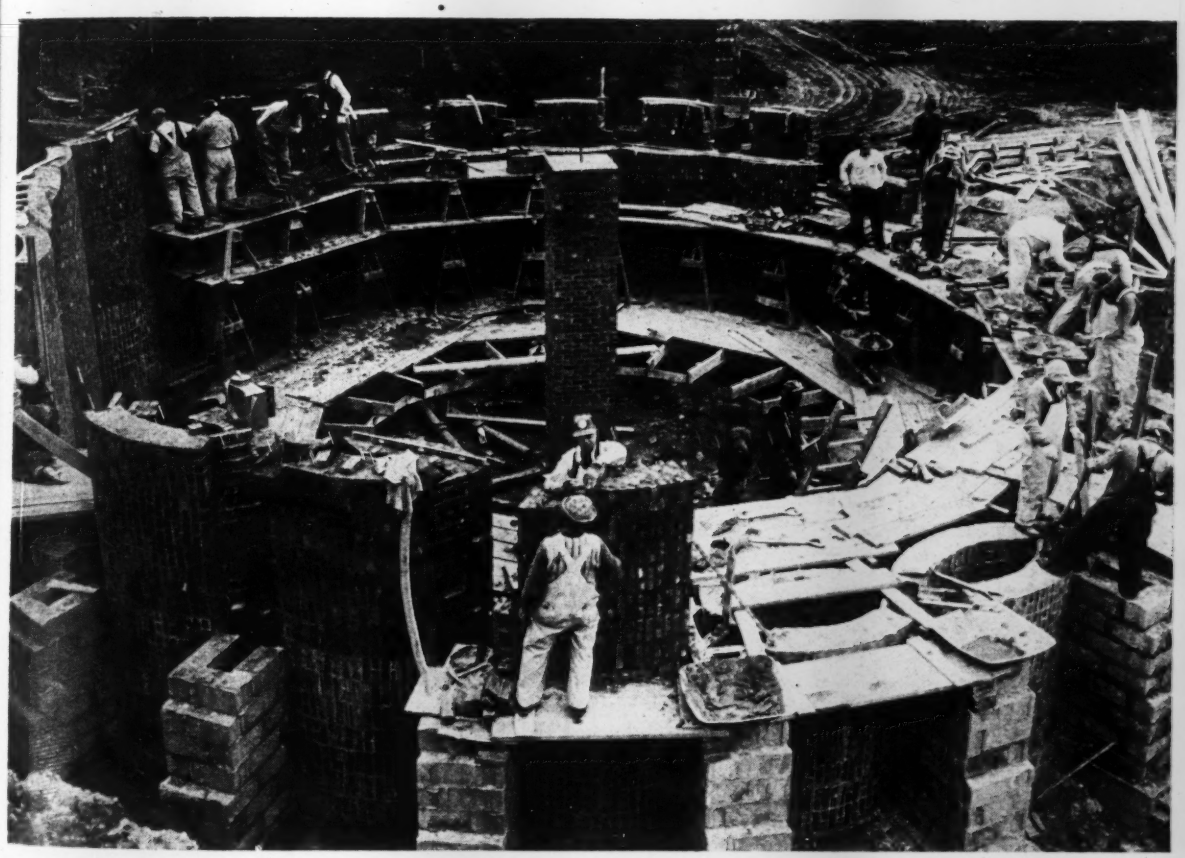


*Fig. 2. **Digester tank with double arches. The outer arches take the earth thrust and the inner ones take the hydraulic pressure. The space between the arches is left unfilled to insure arch action.***

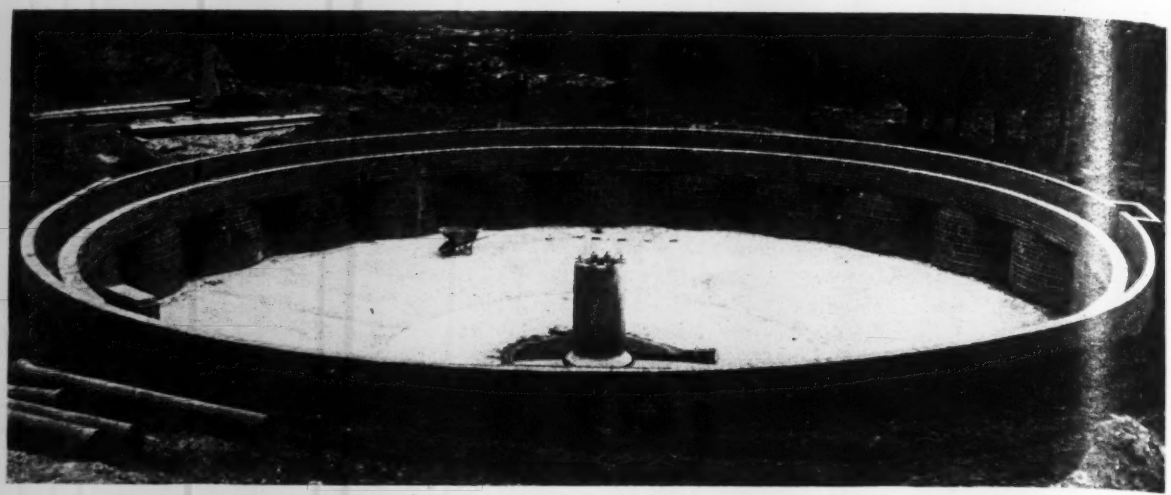


Fig. 3. A brick arched clarifier tank in which only single arches were used on account of its shallow depth. Fill was placed around the tank with bulldozers without injury due to outside pressure on the unloaded arches.

Stresses from which the section of the arch to be used was determined, were calculated for a strip of the arch 1 ft. high at the base of the tank where the hydraulic pressure is a maximum (Fig. 5). Calculations covering stresses due to temperature changes and movement of the supports were investigated and found to be only 5 lb. per sq. in., therefore negligible.

With a head of 7.5 ft. and an arch length of 7.92 ft., the unit pressure becomes 170 lb. If only one-half of the arch is considered, and this half divided into four equal segments, the pressure on each segment becomes 465 lb. These loads are at a right angle to the arch, and will therefore go through its center. Further, there will also be a pressure on the pier of 625 lb., because the width of the pier is 16 in.

It was assumed that the horizontal pressure at the center of the arch was entering at the upper third-point. By ordinary methods of graphical design for a two-hinged arch, this horizontal pressure was found to be 2,480 lb., and that the resultant force at the base of the arch, equalling 2,600 lb., existed at the lower third-point.

As can be seen by Fig. 5, the unit stresses in the arch were very low, varying between 36.6 psi to 0.0 psi.

The resultant on the pier from the reactions of the arches was found to be 4,000 lb., so the total pressure on the pier becomes 4,625 lb. This pressure applies to the bottom strip only, hence the total pressure on each pier becomes 17,300 lb., which is applied 2.5 ft. up. Therefore the overturning moment on each pier becomes 43,300 ft. lb. A pier with a foundation mat 7 ft. wide was found adequate to take this thrust.

Other applicctions

Although the method of vertical brick arches has been shown here as applied to circular arches, it can readily be applied to almost any kind of construction, where a horizontal pressure has to be taken. The author thus has designs worked out for swimming pools and drydocks of rectangular shape as well as straight retaining walls.

The writer is indebted to Capt. Bert Tryon, Signal Corps, U. S. Army; Royton F. Wheadon, construction engineer, and John Fridy, chief designer for William A. Goff, for aid in developing the design. The tanks were built by the Barlow-Heager Co., New York, N. Y.

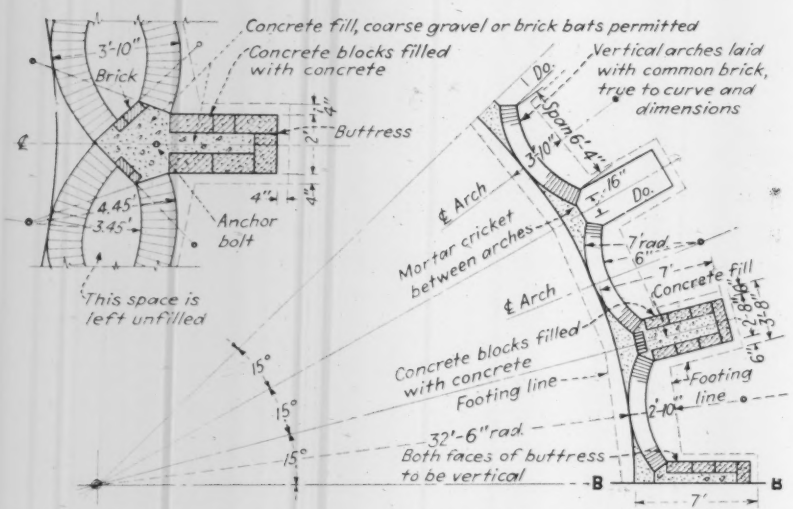


Fig. 4. Section plans of the arch construction showing both the single and double arch details.

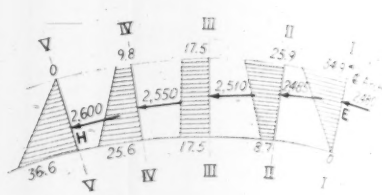


Fig. 5. Stress diagram for the various sections of the left half of an arch.

Heavy-Duty Clay Tile Drains

V. O. McClurg
Chief Civil Engineer, Holabird & Root
Chicago, Ill.

***Contents in Brief**—Installation of extra-strength clay tile, capable of supporting heavy grading equipment, provided an economic method for draining an ordnance plant site. To obtain increased wall thicknesses in the clay tile, the internal dies used for their manufacture were simply machined to a smaller diameter. Comprehensive surveys of existing drainage lines reduced breakage of old tile during grading operations.*

SITE DRAINAGE during construction of an Ohio ordnance plant, involved the preservation of an existing extensive system of tile drains and installation of new drainage lines using extra-strength clay tile capable of supporting heavy grading equipment. Although the drainage problems were not unusual in this type of construction, the method of solution departed from normal practice.

As the ordnance plant was situated on flat swamp land previously converted into farming country by installing the existing drains, it was imperative that the drainage system be preserved. Therefore, a comprehensive survey was made to reveal the locations and extent of all drains. This was useful during construction and later will aid the plant operator who must keep the major portion of the original drainage system operating during the life of the plant.

In making the survey, county maps, showing fence lines, were taken into the field and approximate tile-line locations made directly on them. Considerable data were secured from local residents, and county records supplied information on some of the larger lines. From aerial photographs the location of many tile lines also could be distinguished. Outlets of drains into open channels were also located. All this information was incorporated on a map of the site resulting in a surprising amount of data being acquired at relatively little expense.

Although efforts were made to keep heavy construction equipment away from existing tile lines, especially the more important ones, it was not always possible to do this. Consequently, there was considerable crushing of old drain tile, and where detected, these failures were repaired as well as all breaks in drainage lines necessitated by construction of new sewer and water trenches.

New drains installed

Several additional drainage lines were constructed in which the clay tile, placed in shallow trenches, were subjected to considerable superimposed loads from the construction equipment. Installation of tile drains after completion of grading operations was deemed uneconomical, both as to extra expense involved and time required for construction.

The strongest clay tile available had an ordinary supporting strength, as defined by A.S.T.M. standards, of 1,600 lb. per lin. ft. Considerable breakage was anticipated if this strength tile were used and such failures would be difficult to locate and repair.

Satisfactory clay drain tile were finally obtained at little extra expense by machining down the internal casting dies used in making ordinary tile, thereby increasing wall thickness, with only a minor sacrifice in internal diameter. By such means, tile of 3,600 lb. per lin. ft. crushing strength were produced.

Several thousand feet of this type of heavy-duty tile was used on the project with virtually no breakage from extraneous loads.

Clay tile drains in shallow trenches supported heavy grading equipment at an ordnance plant. Ordinary internal dies were machined down to produce extra thick tile of 3,600 lb. per lin. ft. crushing strength.

Refloating the S. S. "Normandie"

Hal W. Hunt
Assistant Editor, Engineering News-Record

***Contents in Brief**—The French built Normandie, now the U. S. S. Lafayette, sunk at a pier in New York 18 months ago, has just been righted and raised by the conventional method of closing all exterior openings and pumping out the water within the vessel to create buoyancy for the ship to lift herself. Actual raising took only a few days but for months all divers that could be obtained have been patching the hundreds of openings in the side and deck of the vessel that were under water, shoring decks and building bulkheads to separate the vessel into compartments so that pumping could be done in various compartments individually. The Ship Salvage Division of Merritt, Chapman & Scott Corp. shared credit with the Navy.*

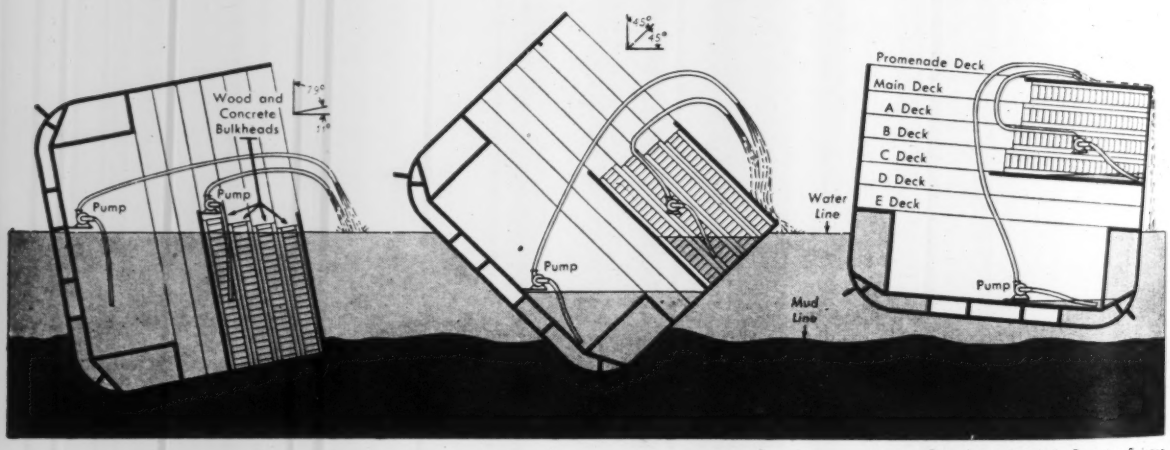
THE NORMANDIE is again afloat! The former French liner, expropriated by the U. S. and renamed the U. S. S. Lafayette, was raised this week from the mud of North River (the Hudson), where she has been lying on her side for 18 months at the foot of West 48th St. in Manhattan and will be reconditioned as a troopship. The vessel capsized and sank at her pier following a disastrous fire on Feb. 9-10, 1942. Buoyancy within the vessel itself was used to lift the huge ship; controlled pumping being employed to clear the ship of water in such a manner that she could right and raise herself.

The 1,029 ft. long, 119½ ft. beam ship lay on her port side, so that she was half submerged at high tide with all of her compartments flooded to water level. It was feared that it might not be possible to raise the vessel or that the ship might never again be made seaworthy but a salvage board of competent marine authorities agreed that the vessel should be raised with all speed possible.

It was recognized that raising the Lafayette was the greatest salvage job of all time, requiring more underwater work than has ever before been undertaken. Estimated cost then of salvage was $5,000,000 to $6,000,000, of which expenditures up to June 1, 1943, totalled $3,050,000. Current estimated cost of raising the vessel is $3,750,000. Rear Admiral E. L. Cochrane, chief of the Bureau of Ships, testified before a House appropriations subcommittee that total cost of salvaging, rebuilding and outfitting the Lafayette as a troop transport will approximate $20,000,000 and that it would cost upwards of $50,000,000 to build a comparable troop-carrying transport.

While on the bottom, the ship lay in the 400 ft. wide slip between Piers 88 and 90 North River and against the south pier (88), which it struck and damaged as it heeled over. The slip is 1,100-ft. long and has a theoretical 45-ft. draft above mean low tide. The inshore end of the slip has a level rock ledge at El-46 but from a point about 250 ft. outshore from the bow of the ship the rock dips sharply to El-160 below the stern of the vessel. Accretions of silt from the river constantly build up in the slips and the Lafayette is partly supported on the mud, which was at El-36 around the vessel. The vessel rested somewhat on the rock ledge with its stern 8 ft. lower than the bow, a settlement of 3 ft. at the stern having taken place after position of the ship was definitely established immediately following the fire.

With the ship in the half-sub-



Based on sketch in Popular Science

Fig. 1. Salvage pumps, 93 of them with a combined capacity of 9,000,000 gal. per hr. were used first to rotate the U. S. S. Lafayette to about 45 deg. then pumping schedule was shifted so that the vessel rose clear of the mud before righting. Water in starboard tanks is admitted to balance the salvage gear opposite.

Acme photo

Fig. 2. The former Normandie rotates slowly as controlled pumping from the submerged port side creates buoyancy within the vessel itself, the only force great enough to raise the huge liner. Former waterline may be seen at "8" on gage.

merged position controlled pumping of individual compartments appeared the fastest, cheapest and most certain method of successfully raising the vessel. But this required a prodigous amount of underwater work.

Salvage required the following general operations: removal of the three top decks of the vessel down to the promenade deck, both above and below the water line; removal of all partitions, furniture and other inflammable material both above and below the water line; closing 16 cargo ports and 356 air ports on the under water side of the vessel; removal of about 10,000 cu.yd. of mud; close all promenade deck openings, and make intermediate "C" deck watertight; install timber and concrete bulkheads to extend existing watertight bulkheads to the promenade deck at several points; shore under promenade deck and at other points where the expected differential head of water would not be resisted by the existing structure; close all pipe lines in the vessel leading from one compartment to another; install 93 salvage pumps, with capacity of 155,000 gpm.

BRIEF RESUME—U. S. S. LAFAYETTE

Built by Compagnie General Transatlantique at Le Havre, France; launched as *Normandie* in 1932 and completed in 1935 at a cost of $56,000,000. Length 1,029 ft. overall, 981 ft. between perpendiculars; beam 119½ ft.; gross tonnage 79,280; displacement 53,000 ton. Main propulsion plant; 29 boilers delivering 160,000 hp. through turbo-electric drive to four propellers.

As the *Normandie* on the European run, the vessel carried 2,000 passengers. She established a record for the Atlantic Ocean crossing making the trip eastward in 3 days, 22 hours, 7 min., an average of 31.2 knots for 2,936 mi. (Later the British liner, Queen Mary, clipped 19 min. from this time.)

The liner, tied up in New York, was expropriated by the U. S., and renamed the *Lafayette*. She was being refitted as a troop ship when, on Feb. 9, 1942, she caught fire at her pier in North River, Manhattan, and capsized from water poured into the superstructure.

In addition to this work on the ship detailed calculations of stability and strength of the vessel during the righting operation were carefully made. Also, a portion of the pier against which the ship was expected to roll in righting was removed and fender piles were driven to prevent further damage to the ship or pier.

The question most frequently asked concerning the Lafayette is why it has taken so long to raise the vessel. Actually, the raising itself took only a week and could have been accomplished in a few hours, but more time was allowed to assure that the vessel did not rise so rapidly that it would get out of control. Preparation for raising the vessel required most of the 18 months the ship has lain on the bottom, largely due to all work being done underwater.

The three superstructure decks above the promenade deck of the liner were stripped immediately following capsizing of the vessel, as it

Press Association photo

Fig. 3. Just as many deck openings had to be covered in the half of the promenade deck below water as may be seen above water.

Acme photo

Fig. 4. Rotation of the Normandie brings up the deck patches placed underwater. Valves through the patches permitted tidal flow until pumping started.

was recognized that whatever method of salvage, or even scrapping was adopted, it would require the removal of this top-heavy load. Some equipment was salvaged but most of the material from the upper decks was cut up into readily handled pieces and salvaged as scrap. Underwater burning with a hydrogen and acetylene flame was used to remove the sections below water.

All of the work of patching, placing bulkheads and shoring was done under water so inky black that the most powerful of underwater lights could not penetrate it. Divers were obliged to work in absolute blackness, doing everything by touch.

Builders' plans of the ship were available, but drawings showing the many revisions made during construction and while the ship was in service were aboard at the time of the fire and were not legible when recovered. Consequently, many openings between compartments inside the hull were found only by most diligent search.

Before the divers could even enter the submerged areas of the ship, it was necessary to clear the spaces of dunnage, miscellaneous stores and equipment. When the vessel rolled over the furniture and all other loose objects inside fell to port side and passageways were blocked with debris. All of this material had to be removed piece by piece by divers who separated it into sections small enough to be handled, and then guided it out of the compartment and up to the surface.

Where ports were open, 10 to 30 ft. of mud was forced into the vessel, requiring removal before divers could even get to the openings to start the repair work. Broken glass in the mud was a constant threat to diving, as this and ragged steel edges throughout the ship threatened to sever air and life lines. An unexpected hazard was spun glass, which had been used for insulation throughout the ship, and which penetrated the divers' suits and into the skin pores. No way was found to remove the fine glass except allowing time for it to grow out.

Hole closure

The 356 port holes on the side of the vessel under water were closed with what is known as the Tooker patch, developed some time ago by "Captain" John I. Tooker, salvage superintendent for Merritt-Chapman & Scott. The patch is a hinged wooden disk formed so that it may be folded in the middle to pass through a port hole. It is then opened on the outside of the vessel and toggle bolts used to pull it up tight against rubber washers on the exterior, the bolts being held by a short piece of channel laid across the inside of the opening.

The sliding cargo doors under the port side of the ship were closed underwater and blocked with I-beams, then concrete was poured over the area to reinforce it and make it watertight. Hatch openings in the underwater half of the deck, some as much as 20x50 ft. and totaling 5,500 sq.ft.

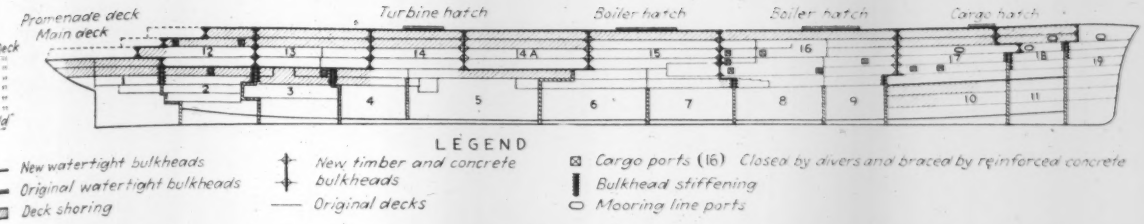


Fig. 5. The Lafayette was divided into 13 separate watertight compartments, some decks and bulkheads being strengthened to take a hydrostatic load never expected when the liner was built. Bulkheads and shoring required placing 240,000 ft. b.m. of lumber underwater.

were patched by placing preassembled covers of plank and steel I-beams over them, the covers being held in place by hook-bolts through the deck. Some of the deck patches have openings through them for passage of divers and are equipped with long-stem valves that could be kept open to permit flow of the tide, yet be readily closed when the pumping was to start. Divers also placed 4,500 small wedges, plugs and miscellaneous patches in unclassified openings.

Before preparation for raising could be undertaken it was necessary to clear out the mud, sometimes as much as 30 ft. deep, that had been pushed into the hull. This was done with an air-lift, in which air at 80 lb. pressure was discharged through a ring at the bottom of an 8-in. diameter pipe, the buoyancy of the rising air in the column of water above forming a vacuum that drew the water and some mud from the bottom of the vessel, discharging topside. During the time that the air lift was in operation, water was continually admitted to the compartment so that no differential head developed and a diver worked with the air lift, directing and controlling its movements.

Division of the hull into several compartments by extending existing watertight bulkheads and shoring to strengthen existing decks required placing 240,000 b. ft. of wood under water. Nine new bulkheads were placed above the *C* deck spanning the 9 ft. between each of the four decks above and, with the existing bulkheads, divided the vessel into 19 separate water-tight compartments. For raising, some of the compartments were left connected and pumping was carried on in 13 separate spaces.

The timber bulkheads installed for water-tight construction were 8x12-in. splined timbers placed between the steel decks so that they are vertical when the ship is in normal position. When placed, with the hull at a 79 deg. list, they were approximately horizontal. The bulkheads were held by bolting angles, Fig. 7, above and below the deck steel to make a slot into which the timbers, with their splines, could be slipped. The deck steel was stripped bare of covering and bolt holes to attach the angles were made by drilling under water. The 8x12-in. timbers were placed from the top down, the top timber being placed in the slot, and successive ones tilted at a sufficient angle that they passed the angle iron and were allowed to float up against the timbers above. This method was found more satisfactory than attempting to place the bulkhead from above, forcing the timbers down against sliding resistance and buoyancy of the lumber.

Fig. 6. Divers placed patches over 356 portholes using a hinged timber unit that passed through the hole and was held inside by toggle bolts to a channel laid across the port.

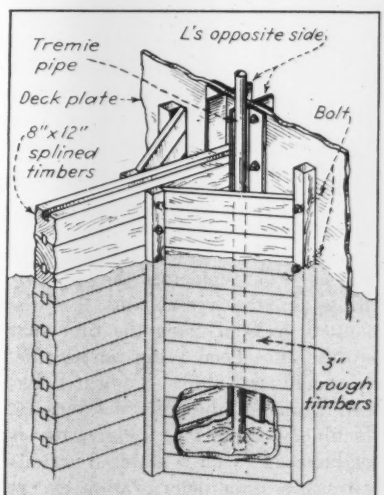


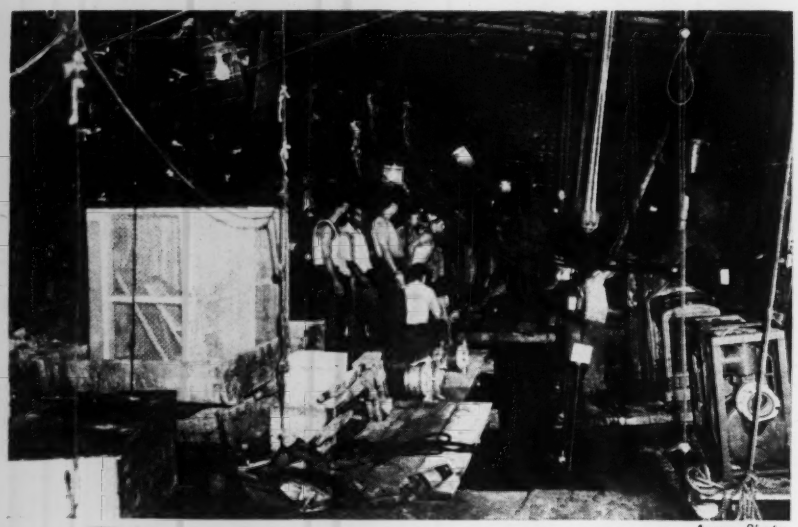
Fig. 7. Angles were bolted above and below decks, splined timbers placed then corners secured and made watertight by concrete, all work being done underwater.

After the main bulkhead timbers were in position, the connections were made water-tight and the angles reinforced against movement by framing with wood a triangular pocket into which concrete was tremied. When complete, the concrete at each bulkhead was roughly a diamond shape, cut in one direction by the steel deck and in the other by the timber bulkhead.

Decks of the ship were not designed to resist a hydrostatic load. It was necessary in some cases to reinforce the decks to carry the imposed stresses of water outside the hull and between compartments while the ship was being pumped out. Timber shores, generally 8x8 in., were used for this construction, being placed underwater by divers.

Pumps on hinged platforms

Because it is necessary to have pumps reasonably level to operate efficiently, the pumping units for taking the water from the hull of the Lafayette were mounted on hinged platforms. A block and fall connected opposite the hinge made it possible to compensate for movement of the ship, thus keeping the pumps level. As pumping proceeded it was necessary to move the pumps to suc-



Acme Photo

Fig. 8. Pumps, in the Grand Lounge of the ex-Normandie, are on hinged platforms held by block and falls, which keep the engines level for efficient operation.

cessively lower levels to keep them always within 20 to 25 ft. of the surface of the water.

A total of 93 pumps was installed 40 10-in., 28 6-in. and 25 3-in., all gasoline driven centrifugal units. Capacity of the pumps was 9,000,000 gph., far in excess of that actually needed for the raising operation, which required removal of only 26,000,000 gal. of water. It was necessary to have additional units so that rapid pumping in particular areas could be undertaken quickly if for any reason the vessel did not act as anticipated, and to serve as spares during the shifting to lower level. Compartments were test pumped individually before raising was undertaken to assure that no openings to the outside or through bulkheads existed.

Vessel rotated, then raised

With all in readiness, the pumps were operated to unwater the hull so that the first movement was a slow rotation from the inclination of 79 deg. to about 45 deg., the vessel all the while somewhat in contact with the bottom. Pumping was done slowly to give the suction of the mud under the hull time to release its hold. This was speeded by divers working under the vessel with air and water jets, loosening the mud so that it would not give way all at one time, thus permitting a rapid change in the vessel's condition and possibly disastrously rapid movement.

Once afloat, the stern of the vessel was hauled upstream a little so that it would not strike the outshore end of the pier against which it rested. Subsequent pumping of the water from the hull brought the huge vessel to nearly normal position, but with a decided list to port caused by the port-hole patches, and installation of bulkheads on the side of the vessel formerly underwater. The starboard wing tanks and double bottom tanks were flooded to partially correct the list.

The U. S. S. Lafayette will be rehabilitated for service as a troop ship. First, the extraneous material added for the salvage operation will be stripped from the port side of the hull, and from its interior so far as possible, so that the present list of the vessel can be corrected. It is expected that the ship will be ready for turning over to rebuilders before the end of August.

Reconditioning of machinery will be an extensive and time-consuming job, as will replacing the interior fittings of the vessel and the dismantled decks. During the time that the liner has been lying on its side, the machinery above the water has been protected by rust preventives. Machinery completely under water is not believed to have suffered serious rusting or other deterioration except for electrical parts. The mechanical parts are, of course, being immediately dried and rust preventive applied.

About six to eight hundred men have been employed on the salvage of the Lafayette for the past year. An average of 70 divers have worked every day on the great liner in preparation for raising.

Lack of divers has been a delaying factor in the salvage of the vessel as few divers have been trained in this country in several years. Most of the divers are elderly men who learned the trade long ago, and it has been a rather closed profession. However, the Navy took advantage of the opportunity for training and established a divers' school on the pier at which the Lafayette lay. Here young men of the Navy were trained for under water work, using the Lafayette as an inspiration, and a place to gain experience as soon as they had learned the rudiments of under water work.

Supervision

Raising the Lafayette was assigned to the Office of the Supervisor of Salvage U. S. Navy, which was established in the Navy Department under the Chief of the Bureau of Ships, prior to the outbreak of the war. The Supervisor of Salvage directs the salvage facilities and personnel acquired by the government when it took over the ship's salvage division of Merritt-Chapman & Scott Corp. (*ENR*, Jan. 29, 1942, p. 166). Salvage was undertaken directly by the Navy rather than under a salvage contract using as little key personnel from the M-C&S Corp. as possible so as not to interfere with other salvage work being conducted in coastal waters.

The Navy Salvage Service was headed by Captain W. A. Sullivan, USN (then Commander Sullivan, USN) during the first part of the salvage work on the Lafayette. He was transferred to the North African Theater of Operations last November, taking with him many of the young divers trained at Pier 88. Since November, Captain B. E. Manseau, USN has been acting supervisor of salvage of the Bureau of Ships. Lt. Comdr. C. F. Chandler, USNR, has served as resident salvage officer in charge of work on the Lafayette.

For the Merritt-Chapman & Scott Corporation, "Captain" John I. Tooker has been in charge as salvage officer, M. C. Gilbert, III, has been salvage engineer, and A. C. W. Siecke, served as Naval architect and consulting engineer, supervising the entire program of stability and strength calculations.

ENGINEERING ABROAD AS SEEN BY ENR EDITORS

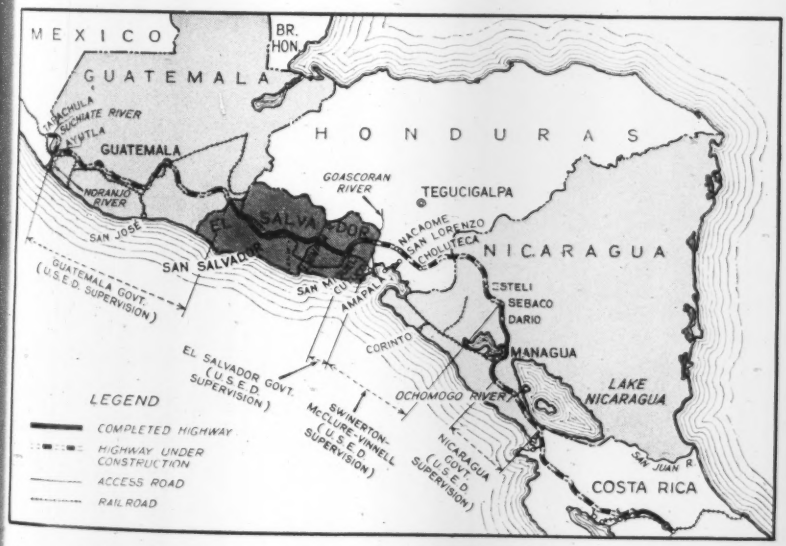
Building the Inter-American Highway

Part II—Construction in the Four Northern Republics

A. N. Carter
Assistant Editor, Engineering News-Record

● **Difficulties involved in locating the Inter-American Highway through Central America and in bringing in supplies and housing the workmen were described in the July 29 issue of *Engineering News-Record*. Those operations were preliminary to the main task of building the 1,569-mile highway. That task is described in this and a following issue. Included are grading, constructing the bridges and culverts, and surfacing the road with crushed stone or gravel to make it adequate for military traffic regardless of weather conditions. The countries covered in this article are Guatemala, El Salvador, Honduras, Nicaragua.**

THE INTER-AMERICAN HIGHWAY through the Central American republics has a total length of 1,569 miles, of which 715 miles are new construction; 613 miles traverse existing roads that can be used without change or with only minor improvements, and 241 miles follow old roads or trails that must be largely rebuilt. The existing sections, for the most part, are in settled regions and, generally, lie across terrain where no great construction problems were involved in making a road. Sections now under construction, on the other hand, are mostly in remote regions where difficult construction often is involved. Dense jungle must be penetrated and much of the new work is through mountainous territory. Tropical rains add to the problems of the roadbuilders.



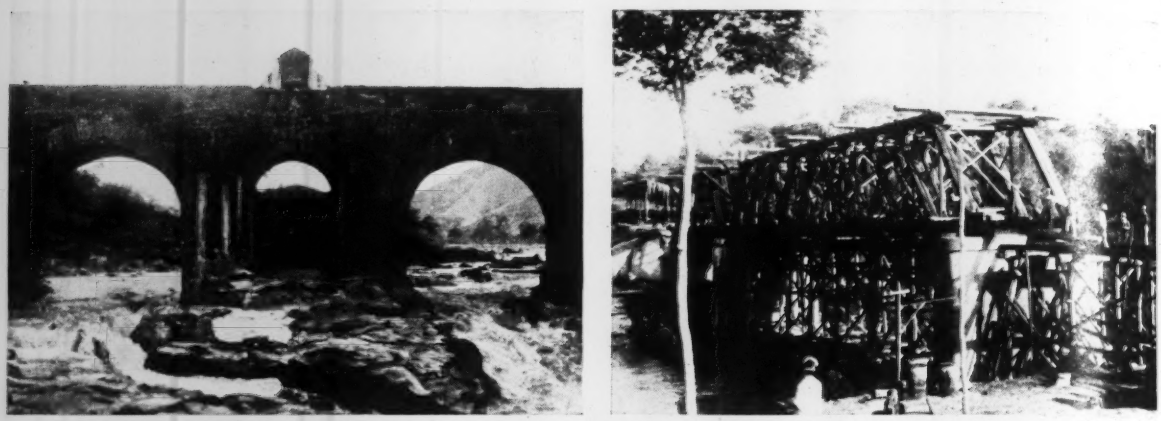
Across El Salvador the Inter-American Highway is soon to be completed, but much construction remains in Guatemala, Honduras, and Nicaragua.

Because the method of attack was altered to meet varying conditions in the several countries crossed by the highway, construction operations can best be described country by country.

The highway crosses from Mexico to Guatemala by the Talisman Bridge over the Suchiate River. At that point it is practically at sea level, but it soon climbs to an elevation of 1,100 ft., running at about that elevation for nearly 140 miles, and then climbs through the mountains to Guatemala City at El. 4,800. In places the road is over a mile high.

The route across Guatemala to El Salvador is 305 miles. Of this, 22 miles is usable highway, 188 miles must be reconditioned and 95 miles is new construction. The last 15 miles is a gravel road completed a few years ago under supervision of the U. S. Public Roads Administration and now needing repair.

As Guatemala has a well organized highway department maintaining 3,500 miles of road, the U. S. Engineers contracted with the Republic of Guatemala to build the highway in that country on a basis of the actual cost of the work. The Corps of Engi-



Built in 1592 by the Spanish colonials with slave labor, the masonry bridge at left carries the road over the Esclaros River. At many other streams in Guatemala truss bridges of type shown at right are being built of timber sawed locally.

neers was to make available as much equipment as possible, but hand labor was to be used extensively. This arrangement was followed for the following reasons: The department is accustomed to building roads by this method; much hand labor is available; wages are low in Guatemala; and more machinery and operators thus could be made available for the work in the other countries.

New construction requires 2,400,000 cu.yd. of grading, varying in amounts from 250,000 cu.yd. of side hill cut per mile where the road leaves the Suchiate River valley to as little as 2,000 cu.yd. in a few places. New locations to shorten the route and to improve alignment and grade are common. Bridges to be built or reconstructed include 200 with spans over 20 ft. and 1,250 smaller drainage structures.

Construction started on a large scale in Guatemala in November, 1942. As of July 1, about 1,000,000 cu.yd. of grading has been completed by the 8,000 native workers engaged on the project.

Across Guatemala the predominate soil encountered is a red volcanic clay easy to work. Where the side slopes are cut by hand they may be left vertical, without danger of future slides. However, as cuts with straight sides cannot be made in this material with grading machines, banks in the areas where mechanized equipment is used must be carried back on a flat slope to avoid big slides. In the mountains flat slopes would require too much excavation. Hence, the preferred method is to cut the banks at the most convenient slope, removing any slides that occur subsequently. As a result, extensive maintenance will be required along the highway during the first few years.

Where the grading work is by wheelbarrow, the fills are compacted by hand tampers, especially along the shoulders; but in areas where bulldozers are available to spread the material, hand tamping is not re-

Salazar Photo

Rock work in Guatemala and El Salvador is difficult because of lack of supplies and equipment. Salvadorean workers at left illustrate hand drilling methods. When blasting powder is lacking, wooden plugs are inserted in the holes and wetted frequently to crack the rock. Worker at right shows length of plug used.

quired. In the sections where all mechanized equipment is used, movement of the equipment produces sufficient compaction under most conditions. A few rollers are used.

Where rock is encountered and no blasting powder or dynamite is available, the ancient practice of drilling holes in the rocks and inserting soft wood plugs is followed. Wetted frequently, the plugs swell and crack the stone. In other places the stones are cracked by building fires around them and chilling the rock quickly with cold water. In these areas, in order to open the road sooner than would otherwise be possible, a common practice is to excavate to about one-half the desired width and then to widen the cut to the full width while work is carried out ahead.

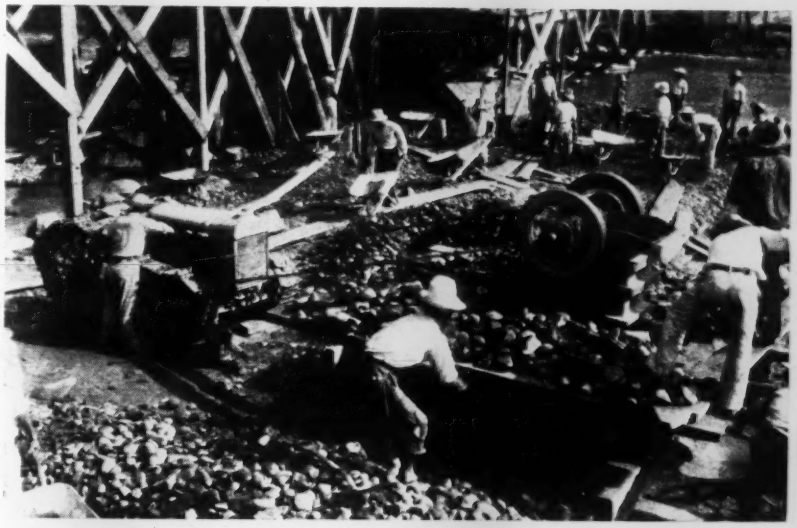
Crushed rock is used primarily for surfacing, as little usable gravel is available. American-made mechanical crushers are set up along the rivers to produce the aggregate. In many cases, ox teams, obtained at 50c. a day with driver, are used to deliver the stone to the crusher, since only short hauls are required. At one time, 200 teams were thus engaged.

Trucks are used to deliver the crushed rock on the road. Depth of surfacing varies with the subgrade conditions encountered. The rock is spread by hand for the full 16-ft. width of the roadway, requirements averaging 1,500 cu.yd. per mile. A stone of 1½-in. maximum size is proving most satisfactory. For the most part, compaction of the surfacing is by traffic rather than by rollers.

Many types of bridges are being built. Over the Narango River an old steel deck truss is being used. It was brought from an abandoned railroad built by German interests many miles away in Guatemala. As rebuilt, the bridge consists of four spans, each slightly over 100 ft. long. The deck is to be timber.

Several crossings are to consist of timber truss spans fabricated from untreated timbers cut at local sawmills. The trusses can be fabricated at a reasonable price. As a result, the cost of these bridges in place, exclusive of foundation, is $100 per foot of completed bridge. These bridges are designed for a minimum life of 5 years.

To check the calculated deflections, a truss span made from these timbers was erected at the sawmill and tested by driving several heavily loaded trucks on the roadway. The deflection was found to be slight and the structure was considered to have a high safety factor. Data as to the properties of the local timber were made available by the International Railway Co. of Central America and by the U. S. Forest Service.



Crushed stone for surfacing the road and aggregate for the concrete work are produced by American-made crushers. This crusher, operated by a Fordson tractor, supplies aggregate for Narango River Bridge piers.

To eliminate the need for reinforcing steel—a critical material—bridge piers and abutments are made of cut stone or plain concrete. Cut stone is preferred, since it saves cement. Aggregate for the concrete is crushed on the banks of the streams by mechanical crushers. A local mill is supplying most of the cement, the balance being obtained from mills in the United States.

Many of the smaller drainage structures in Guatemala are masonry arches, common laborers in Guatemala being skilled in such work. Lime mortar is used above normal water level to save cement.

When cement is available, concrete pipe is used extensively for culverts. Pipe sections are manufactured at central yards and trucked to the locations where needed. One big advantage of this type of construction is that a culvert may be built in a very short time. Another advantage is that the concrete pipe may be used for a bypass and later dug up and installed elsewhere.

One of the most unusual existing crossings to be used in Guatemala is a multiple arch bridge built by the Spanish colonials. It is a narrow structure of masonry laid up with a lime mortar said to have been made of lime, milk and honey. A stone tablet on this structure explains that the foundations were started in 1592.

About forty-five percent of the construction required in Guatemala was completed as of July 1. Work in that country is scheduled for completion early next year.

HAND LABOR USED IN EL SALVADOR

The length of the Inter-American Highway in El Salvador is 168 miles. All but 37 miles of this road is of such character as to require no new work. From the Guatemala boundary to San Salvador, the capital, and eastward to within 37 miles of the Honduranian boundary a 20-ft. bituminous macadam pavement built with hand labor a few years ago is available. For the first 25 miles of the remaining distance a poor road exists, but there is only a trail for the last 12 miles. Maximum grades on the completed road, for the most part, are six percent. Alignment, except for a few points in the mountains, is excellent.

The Bureau of Roads of El Salvador has functioned since 1926, and has built a large mileage of first class roads. In this little country,

Salazar Photo

Wheelbarrows play an important part in the grading operations in Guatemala and El Salvador. Steep side slopes are used, which is satisfactory in the volcanic soil encountered.

which is about the size of Vermont, over 4,000 miles of road have been constructed, including 2,500 miles of improved highway.

Only last year the El Salvador bureau completed, without outside financial aid, a modern suspension bridge over the Lempa River, the largest stream in Central America (*ENR* July 16, 1942, p. 74). This bridge has an overall length of 1,305 ft., including an 820-ft. central span. A 24-ft. roadway designed for an H15 loading is provided.

As a result of its past record, the bureau was engaged by the War Department to complete without profit under supervision of the U. S. Engineers a military road to the border of Honduras. The bureau has a number of trucks and cement mixers available, and a few air compressors, but little equipment for moving dirt. This shortage is no handicap, as the grading is light and can be done by hand labor, aided by the available equipment.

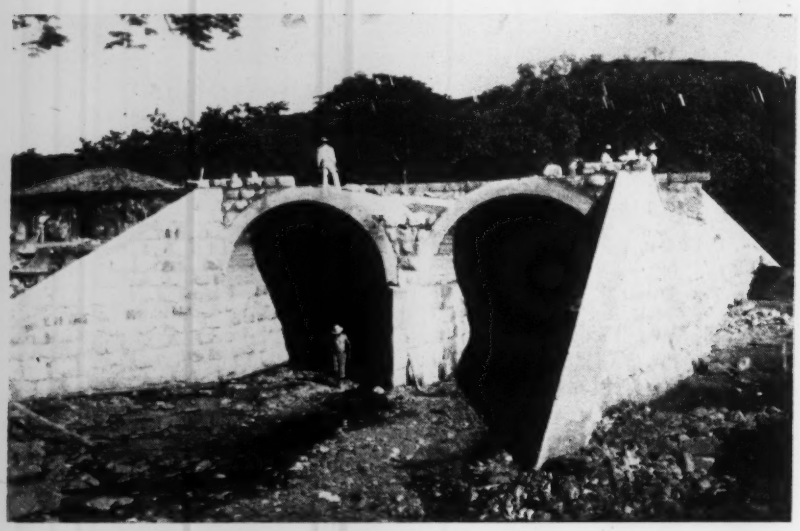
Nearly 2,000 laborers are employed on the 37 miles of new work in El Salvador, which calls for 600,000 cu. yd. of excavation and construction of over 200 drainage structures. Because the completed road in El Salvador has a 20-ft. roadway plus 6-ft. shoulders, the highway now under way in that country is being built to these dimensions. The original plan was to build a bituminous macadam pavement similar to that of the existing roads. However, bituminous materials are now so difficult to obtain in El Salvador that an all-weather road surfaced with crushed rock is being built. The surfacing is to a width of 20 ft.

Soil similar to that in Guatemala is encountered in El Salvador, and the grading and surfacing methods are much the same as in that country. Both these operations in the latter country are to be completed in August of this year.

Bridge construction in El Salvador also is similar to that in Guatemala. Few timber truss spans are used, but several small bridges with timber stringers and a laminated timber deck are being built. Concrete culvert pipe is used extensively.

One type of drainage structure used in El Salvador and not mentioned in describing the Guatemalan work is the culvert built as a combination of masonry and concrete. The abutments are of masonry and the arch is a uniform thickness of plain concrete.

A good example of this culvert is illustrated at the left. This structure consists of two 15-ft. barrel arches of unreinforced concrete about 15 in. thick.



With masonry piers and non-reinforced concrete arches, the above drainage structure is a good illustration of the culvert construction in El Salvador.

International bridge under way

Over the Goascoran River that forms the boundary between El Salvador and Honduras, a new bridge is being built by the Frederick Snare Corp., New York, under a contract with the Public Roads Administration. It is a 481-ft., 3-span, continuous, deck-truss structure with a 21-ft. roadway and a 2-ft. safety walk on each side. The substructure work was completed in July, and the steel, which was fabricated in the United States, is being erected. This crossing is scheduled for completion this fall.

CONTRACT WORK IN HONDURAS

Little work had been done on the Inter-American Highway in Honduras, where 91 miles of the road is located, when the present project was started. Under supervision of the U. S. Bureau of Public Roads a bridge 930 ft. long with two principal suspension spans each 330 ft. in length was completed across the Choluteca River in 1937. Elsewhere little construction had been done.

Much of the mileage in Honduras is across a hot coastal plain, but part of the road is in a rugged mountainous area, climbing to an elevation of nearly 4,500 ft. For about 15 miles the highway follows a poor road that must be reconstructed, and the remaining mileage is new construction. In all, 2,600,000 cu. yd. of excavation will be required, and 592 drainage structures, including 56 of over 20-ft. span, must be built.

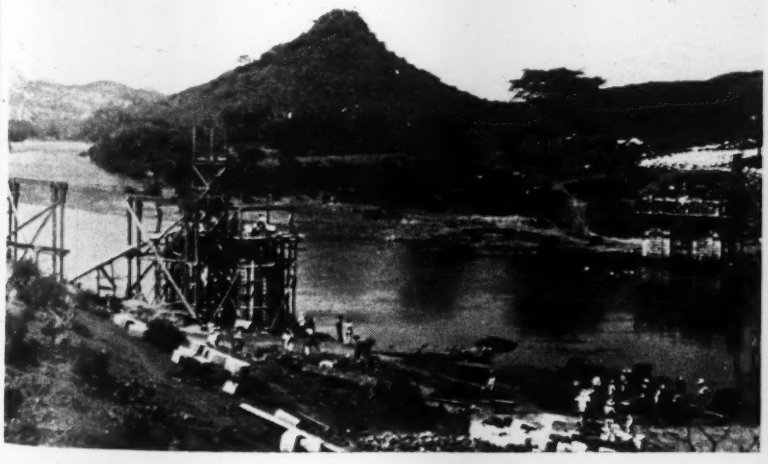
Few towns are located along the highway, as the area crossed is very sparsely populated. Therefore, construction of the highway with local hand labor was not feasible. To have contracted with the Honduranian highway department for the construction also was impractical, as that organization has no mechanical equipment available and has had limited experience on heavy earthwork. Consequently, the work is being done by contractors from the United States on a cost-plus-fixed-fee basis.

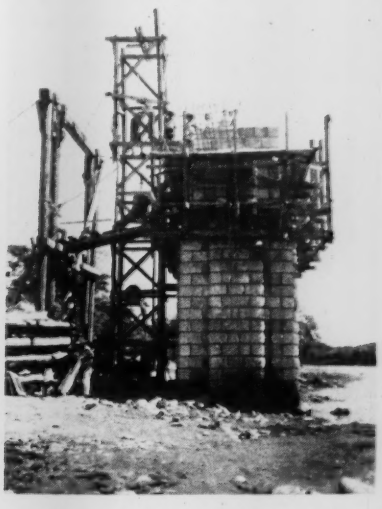
Highway grading, surfacing and construction of all drainage structures except two bridges is being done for the U. S. Engineers by Swinerton - McClure - Vinnell. This firm, which is known as SMV, is a combination of Alfred Swinerton, San Francisco; Tucker McClure, San Francisco; and A. S. Vinnell, Alhambra, Calif. The Frederick Snare Corp., New York, has contracted to build two large permanent bridges under supervision of PRA.

Getting construction started in Honduras was extremely difficult. Labor camps for several hundred workmen had to be established about every 25 miles, water supplies developed, hospitals built, and repair shops constructed. Equipment and materials for this work were delivered by railroad to Cutuco, El Salvador, and transferred by barge to the Honduranian coast. From the coast, materials and some equipment was hauled to the job, but much of the equipment was "walked" to the working point under its own power.

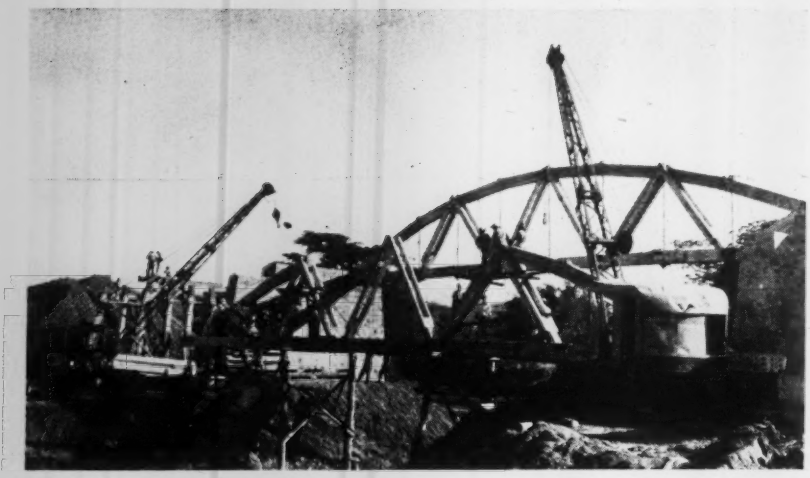
Along part of the project, oxcart trails were available to transport cargo to the highway, but near the Nicaraguan border not even this type of road existed. Improvement of the trails by bulldozer was possible across the level areas, but to provide a good access trail in the mountain areas was difficult because of the extremely steep grades. Since the most distant camps in Honduras were 85 miles from the ocean port, transportation from the dock to the desired location took weeks in some cases, as ox teams were used for much of the hauling.

Excellent alignment of completed road in Choluteca River Valley in Honduras is in decided contrast with the former trail shown at right in this aerial view.





Across the Goascoran River—the Honduras-El Salvador border—a 3-span, steel-truss bridge is being built. Piers are faced with handcut local stone, as picture at right illustrates.



Several bridges in Honduras are being built with trusses assembled on the job of treated timbers fabricated in the United States. After assembly on low falsework, 100-ft. truss at left above will be raised into place by two cranes.

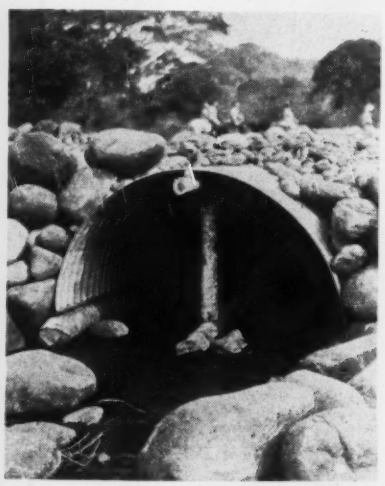
In the same way, "walking" equipment to the job was not a journey of a few hours but of days. Furthermore, movement of some of the machines under their own power was so hard on them that they had to be repaired upon arrival.

Despite all of these problems, SMV, which started work in November, had the first camp under way by December, and by January had completed three large camps, including adjoining repair shops. Equipment began to arrive in January. As of June 1, that on the job and operating included: 13 carrying scrapers, 43 tractors, 7 patrol graders; 5 shovels, and 2 rock crushers. Additional equipment was being received each week. As of July 1, over 40 miles had been graded. The method followed is to concentrate on a few miles and then move to a new section, which means that new camps must be built.

Much of the equipment is operated by workers from the United States, but native operators also are used. Although most of these latter men have had limited experience, they are proving for the most part very satisfactory. Some of the native workers, with training, become excellent mechanics, and many of them are good masons. In all, including common native labor, over 4,000 men are employed in Honduras by SMV. One 11-hr. shift is worked.

In general an overall roadway width of 16-ft. has been used in Honduras. Cut and fill are balanced as much as possible, but in some areas large borrowpits were dug to avoid long hauls. Where excavated material would otherwise be wasted, a roadway width greater than 16 ft. has been used. In the low areas where an unstable soil often is encountered, borrowed material must be added to provide a stable base. Compaction of the fills is by traffic.

Surfacing follows closely behind the grading, in order to keep the road open to traffic. Otherwise, because of the heavy rains now falling every afternoon, a quagmire would result and few vehicles could use the road.



Some culvert pipe is available in Honduras and to make as many culverts as possible half sections are often used. Above pipe is on temporary bypass and had to be braced because of shallow cover. Sections for permanent culverts rest on parallel masonry walls.

In Honduras, as also the remainder of the road south of that country, few good quarry sites are available. As a result, it is necessary to haul the surfacing material for as much as 15 miles. This length of haul presents many difficulties because of the shortage of hauling equipment and the difficult supply lines to be maintained to deliver gasoline, repair parts and other supplies. Despite these handicaps, a total of 20 miles had been surfaced by July 1.

Most of the surfacing material is prepared by American-made crushers moved ahead as the construction advances. Depth of surfacing varies with the subbase conditions. In some cases it is as much as 2 ft. and in other places as little as 6 in. Crushed rock is delivered by truck, spread by end dumping and compacted by traffic.

Bridges are a bottleneck

To complete the bridges well ahead of the grading has been difficult because of the slow delivery of supplies. In many places a temporary log bridge was built on a bypass, and this plan has aided materially, as has the construction of fords across many of the streams. Nevertheless, bottlenecks at several bridge sites still exist due to lack of materials to complete the crossings.

A large number of the drainage structures being built by SMV are masonry culverts, but some corrugated metal pipe has arrived on the job. About one fourth of the drainage structures have been completed. They include 536 of less than 20-ft. span and 56 over 20-ft.

For many of the larger streams, timber-truss spans are built with members fabricated in the United States. Foundations for these structures are built sufficiently wide for a two-way bridge, but the truss spans now being installed have only a 15-ft. roadway. The bridges fabricated in the United States are built of treated timber.

Work has started on the two bridges to be constructed in Honduras by the Snare firm for the Public Roads Administration. Over the Guacirope River a 520-ft., 3-span, continuous, through truss is being built. The superstructure steel has been fabricated in the United States, and is ready for transportation to the job. The second project is the

Grande River crossing. This 481-ft. structure will consist of three steel, through-truss spans varying in length from 100 to 225 ft. Both structures are to provide a 24-ft. roadway and two 2-ft. safety walks.

Work of all types in Honduras is now slowed by the tropical rains that started late in May and are expected to continue until November. Therefore, unless better progress is made than is now anticipated, the highway will not be completed across that country until early next year.

GOOD PROGRESS IN NICARAGUA

Of the 245 miles of the Inter-American Highway in Nicaragua, 91 miles have been completed since 1935. Of this mileage, 15 miles is a good road surfaced with crushed rock, and 76 miles is an asphaltic macadam pavement in excellent condition and of good alignment.

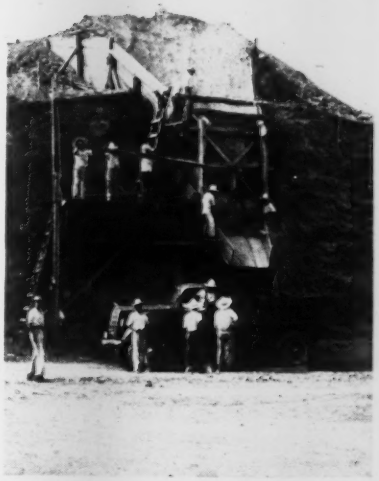
Remaining to be improved is a 5-mile section of 12-ft. road between the rock-surfaced road and the asphaltic macadam. New construction consists of an 84-mile section across a rugged terrain in northern Nicaragua and 65 miles of light to heavy construction in the southern part of the country.

The 84 miles in northern Nicaragua is through a mountainous area where not even ox trails are available at many points. This section is being built by SMV, which makes a total of 175 miles under construction by that organization. The job requires 2,500,000 cu. yd. of excavation and over 400 drainage structures, including 32 of over 20-ft. span.

A large portion of the supplies and machinery for the work had to be transported from San Miguel, El Salvador, all the way across Honduras. This trip of over 100 miles was proportionately more difficult than deliveries in Honduras.

Some of the supplies were shipped by railroad to Cutuco, El Salvador, and transshipped by boat across the Gulf of Fonseca to Corinto, Nicaragua. Other cargo was shipped directly to Corinto. From this port the supplies moved by rail to Managua or El Sauce for movement to the job by "walking," by truck or oxcart. All routes of delivery have been slow and costly.

As of July 1, nearly as much equipment was in use in northern Nicaragua as has been placed in operation in Honduras. More equipment is expected in the near future. American equipment operators are employed, but the common labor and truck drivers are from Nicaragua. The total employment by SMV in northern Nicaragua is 2,500 men. At the end of June the SMV crews in Nicaragua had graded 35 miles, surfaced 13 miles and completed nearly one-half of the bridges and culverts.



In southern Nicaragua American-made gravel trucks are loaded at a rapid rate by chute built by native carpenters of local timber. Chute is filled by bulldozer.

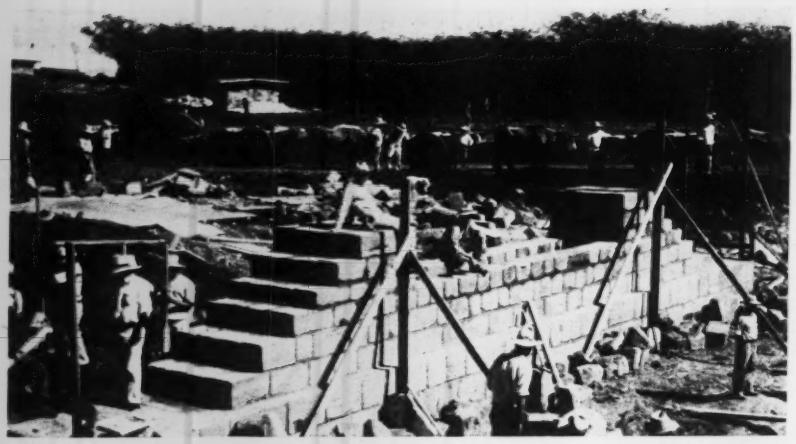
Tuffa, a local volcanic stone, fairly soft in the quarry but becoming hard when exposed to the air, is used extensively for the bridge piers and abutments. Based upon the *vara* system of measurement followed since Spanish colonial days, local laborers quarry the stone by hand in 16½x16½x33-in. blocks.

These blocks are used to build the exterior faces of the piers, and as the walls are carried upward the enclosed area is filled with cement mortar in which boulders as large a 12-in. dia. are placed. The boulders are added at such a rate that the level of this fill is but about one or two courses of stone lower than the outside wall. A dry mix is used, and by building the walls slowly the mortar sets sufficiently soon to prevent displacement of the stone of the exterior walls.

Work in northern Nicaragua is scheduled to end late this year.

The well-organized Nicaraguan highway department is doing the 65 miles of work in southern Nicaragua under the direction of the Corps of Engineers, except for the Ochomogo River crossing, which is being built by an American contractor under supervision of the PRA.

Earthwork in Nicaragua is by American-made equipment. For long sections in northern Nicaragua the road passes through mountainous country much more rugged than seen above.



Many bridge foundations in Nicaragua are built of tuffa, a stone easily cut by hand in the quarry but becoming hard with exposure. Common practice is to build exterior face of foundation with tuffa and fill enclosed area with mortar and large field stones. Oxcarts delivering stone are to be noted.

The Nicaraguan highway department is building several bridges of timber trusses fabricated locally. The 60-ft. trusses above rest on masonry piers.

Both operators and common labor employed by the highway department are from Nicaragua, and the total force numbers 1,200 men.

In southern Nicaragua, where the highway crosses the route of the proposed Nicaraguan Canal, the alignment is excellent, and one tangent is nearly eight miles long. For several miles in this section the road parallels the western side of Lake Nicaragua, which is about 40 miles wide and 100 miles long. This section of the road is a beautiful drive. Grading will approximate 1,100,000 cu. yd. and it is nearing completion. Earthmoving equipment used includes: 11 carrying scrapers and 14 tractors. Operations were started in November of last year.

Southern Nicaragua is one of the few places along the Inter-American Highway where a good gravel supply is available. This material contains a high percent of fines. It is delivered to trucks from a timber chute filled by a bulldozer. Flow of the material down to the trucks is controlled by a hand-operated timber gate. Although made by hand by native carpenters, the device works very well, and at the time of the writer's visit thirteen 4-yd. trucks were being loaded every 15 min. An accompanying photograph shows the chute in use.

Unstable clay encountered

A very unstable clay known as sonsocuite is encountered in many places in southern Nicaragua. It is very fine and structurally worse than the "adobe" so common in the southwestern part of the United States, being extremely sticky when wet and hard when dry. Consequently, it is necessary to keep the sections of road well drained during construction, and fills must be surfaced with one to two feet of imported material. Gravel is used for this purpose and it is covered by well-graded crushed stone of 1½-in. maximum size. Very extremely hard stone is available for the surfacing, which is crushed by an American-made plant. The surfacing is to be completed in September.

The small bridges and culverts being built in southern Nicaragua are similar to those in the northern part of the country. Of the 100 drainage structures required, three-fourths were completed July 1. Of the fourteen temporary timber-truss bridges being erected on this section more than fifty percent have been completed. Spans of 50-, 70- and 90-ft. length are used. Many of these trusses are fabricated in the United States, but a number were made in the shops of the highway department.

The 175-ft. steel truss bridge required over the Ochomogo River is being built by the Snare firm under PRA supervision. Its foundations are well advanced and should soon be completed, but some steel for the superstructure has not been delivered to the job. Thus, completion of the structure is not expected until late this fall. To maintain traffic to operations beyond the bridge, the U. S. Engineers have built a concrete-floored "dip" downstream of the site. Pipe openings take the low-water flow under the roadway.

The 5-mile section that has to be rebuilt is an existing 12-ft. all-weather road near the town of Dario, north of Managua. Work on it will be done by the crews of the Nicaraguan highway department engaged on the work just described. Only light grading is required and surfacing stone is available in sufficient quantity. In addition all the culverts are in place, having been built a few years ago. Thus, to close this gap will require but a short time, once work can start.

(Construction operations in Costa Rica and Panama will be described in the August 26 issue of ENR. *as will maintenance of the construction equipment used on the road.)*

The Part of Inland Waterways In Latin American Transportation

Fred Lavis
Consulting Engineer, New York

***Contents in Brief**—The major transportation needs in South America are for good routes from the interior to the seaports, hence inland waterways linking the several countries together, while appealing to the imagination, probably will not be built in the near future.*

THE STRATEGY OF TRANSPORTATION of all the Latin American countries, with very few exceptions, is to bring products of the interior—agriculture, cattle, ores—to the coast for shipment abroad and to bring in from Europe and North America manufactured products, typewriters, machinery, steel, cloth, gasoline, fuel oil, chemicals, etc., etc., even certain foods. Consequently, while the proposed waterway from Venezuela to Argentina described by C. J. Siebert in your issue of March 11, p. 360, is very interesting, there appears to be no economic justification for its construction. Also, I expect there are more difficulties than Mr. Siebert seems to anticipate involved in building a waterway from Venezuela via the Orinoco, Rio Negro, some tributaries of the Amazon, the Paraguay and Parana rivers to Argentina.

This, like the old scheme of the Pan American Railway, which goes back more than 50 years, and the present scheme of the Pan American Highway, ignores the basic fact that the transportation problems of the countries of both Central and South America are those of movements of people, goods and commodities, from the interior of each country to the coast and vice versa. They are mostly individual to each country.

The grandiose schemes appeal to the popular imagination, but there is much to do which is practical if not so spectacular and we will be wise if we stick to practicalities.

Peculiar conditions to be met

It is perhaps dangerous to generalize too much about 20 different countries, sometimes very different, in spite of the Iberian origin of many of their rulers and nearly all of their customs but the above is substantially correct for all of them. Hardly any of the countries produce in proper juxtaposition the metals, chemicals, woods, fuel and other supplies required for modern manufacture and there is not the demand which permits the cheapness of modern mass production such as we have in the United States.

There is in almost all of the countries, a shortage of labor. There is no labor for large expansion and in recent years there has developed a more or less intense nationalism and opposition to immigration, especially of negroes and orientals. These latter races are the most likely to adapt themselves to the torrid climate of the countries and areas through which this suggested waterway would be located, which in spite of Mr. Siebert, is trying to the white races. Argentina is the only country which has received European immigrants in any number and the future of that, after the war, is doubtful. Several countries have tried colonization by Europeans but almost without exce-

A waterway from Venezuela south across Brazil, Bolivia and Argentina to Buenos Aires probably could be built but would not serve the major transportation needs of the countries crossed.

tion these colonies all have failed.

As to the project itself, we can only generalize on its technical engineering aspects at the present time. Mr. Siebert admits that the waterway would only be navigable at certain seasons of the year and then only for vessels of 6-ft. draft. He ignores entirely the cost of maintaining these "God-given" channels of commerce. The nature of some of these rivers is indicated by the difference between high and low stages of the Orinoco at Ciudad Bolivar, which is about 90 ft., and then there is only a 12-ft. channel to the sea. The Parana at Posadas has a rise and fall of 40 ft. or 50 ft. The falls of the Caroni, those of the Upper Parana, the Iguassu and the Madeira, widely scattered and perhaps not on this particular route indicate the difficult nature of some of this country. It is true they are not obstacles which cannot be overcome by modern engineering science and methods, but they might involve costly and heavy construction. Only heavy traffic expectations would warrant some of these and the fact that navigation might be limited to certain seasons indicates expense of operation.

Natural waterways to the sea

Colombia has always had the magnificent Magdalena River as its principal means of access from the sea to the interior, but it has struggled for years to overcome the handicaps of transportation by this route. It has had in mind for years a railway from Bogotá to Puerto Nacional on the lower reaches of the Magdalena. Antioquia tried to overcome the handicap by building the Carretera al Mar —the highway to the sea at the Gulf of Uraba.

The effective channel of the Rio Parana in Argentina from the confluence of the Paraguay and Parana in Corrientes is only maintained by constant work by the government dredges and channel deflectors. The entrance to the Port of Buenos Aires, a very long channel, is only maintained by constant and continuous dredging. The latter perhaps is not a factor of the suggested waterway but they all go to show that waterways inevitably involve expense, often considerable expense, for maintenance. The rainfalls, runoffs and floods of the region under consideration are phenomenal as the differences between high and low water stages indicate.

Now let us follow the project from North to South in its major aspects. There are multitudes of details but those are not for this very brief discussion. The population of Venezuela today is less than 4,000,000, the area of the country is equal to the combined area of all the Atlantic Coast states of the United States from Maine to Florida, inclusive. Most of this population is located along the north coast area some distance from the Orinoco valley. What Venezuela needs is more labor to develop its oil resources and produce food. It would not benefit in the least by a waterway connection to the Rio Negro. Even supposing the intense development of the Amazon basin required gasoline and fuel oil which Venezuela produces, it is doubtful if this suggested waterway is an answer to the question of transportation. It is almost sure that tankers from the lower Orinoco, from Caripito or even from Guanta, could transport oil to the Amazon, to Belem (Para) and up the river to Manaos more cheaply than by any other means. They can even, as Mr. Siebert says, reach Iquitos in Peru.

In the somewhat remote possibility that the Gran Sabana at the extreme southerly end of Venezuela might be developed in the foreseeable future by immigration, this proposed waterway would be of little use, it is too far west. The means of communication will be by railway or highway or both to Ciudad Bolivar.

Where they need oil and gasoline in Brazil is on the east coast below Bahia and this waterway wouldn't do that any good. There seems to be no foreseeable traffic between Venezuela and the Amazon basin in either direction.

No artificial outlet needed

Let us suppose for a moment that the Amazon basin is to be developed, that, as Mr. Siebert intimates, its climate is salubrious, and that the introduction of sanitation, hygiene and medical service would keep some of the people healthy and reduce infant mortality from about 90 percent to let us say 50 percent. Suppose rubber can be produced in competition with the Malayan Archipelago and synthetic rubber. Suppose a population and suppose the production of some other commodities; even then, the outlet and inlet, the communications with the rest of the world are via the Amazon and its tributaries, from Para to Manaos and then westward by waterways, railways or highways fanning out into the hinterlands of Colombia, Ecuador, Peru and Bolivia. It is sure that they are not via some small tributaries to Venezuela or southerly via the Paraguay and Parana rivers to Argentina. As a matter of fact, this agrees with what Mr. Siebert himself says in his eulogy of Manaos. It is a city accessible to ocean-going steamers with large tributaries reaching westward to all the Amazon basin. Why then a precarious waterway to Venezuela?

Territories to the south

There remains then the area south of the Amazon basin, the area tributary to the upper waters of the rivers Paraguay and Parana. The Chaco, of Bolivia and Paraguay, with part of Brazil, almost entirely uninhabited but in its southerly portion raising some cattle and exploiting what remains of the quebracho. It has, however, potentialities of oil development, possibly large oil development. There already exists the Paraguay River, the natural God-given outlet which man has to maintain. But in course of time this country will be reached and developed by railways and highways extending northerly from the Argentine and by pipe lines from the oil fields extending southerly to Santa Fé or Rosario.

We have seen in the United States the attempt to revive the inland waterways of the Mississippi valley and the south and to maintain the Erie Canal, none of which are justified economically except on the possible basis of power production or flood control or prevention. If first costs and costs of maintenance be added to actual transportation costs they cannot compete with the railways either in time or cost. There are a very few exceptions where traffic originates and terminates on the banks of the same waterway, which is the case in a few instances on the Ohio.

There is a great deal to be done or which might profitably be done by capital investments in Latin America but I don't think this suggested waterway is one of them. I think that for a long time we should stick to sane developments, based on known economic factors, and thus build up a real good-neighbor policy by demonstrating Yankee shrewdness in business in which our neighbors share.

More Service From Rock Crushers

● These suggestions for better operation of crushers are based on many years of engineering and manufacturing experience as well as an intimate contact with owners and operators of crusher plants and trouble-shooting on all types of crushing operations. They are made available in the interests of conservation of equipment by Leslie S. Hackney, sales manager, Universal Engineering Corp., Cedar Rapids, Iowa.—The Editors.

THE WAR EFFORT requires unusual quantities of crushed rock and gravel for scores of purposes but new equipment and repairs for old machines are difficult to get and delivery is slow. Consequently it is necessary to get the most from crushers with the least damage to available equipment.

It is most important in operating a crusher to avoid feeding stone that is too large for the crusher opening, because this practice increases wear and reduces production. Big stone will bridge the jaws, prevent nipping and choke the mouth of the crusher so that new material will not feed into the machine. A cardinal rule of crusher operation is not to use a sledge to break a large rock in the crusher while it is running.

Avoid dumping directly into the crusher feed opening, using instead an apron or conveyor feeder dumping onto a grizzly or screen. This procedure is preferred because it provides a steady feed and by-passes the fines. Where factory-made feeders are not available, a dump box or ramp helps solve the production problem. Material can be raked or shoveled into the crusher opening and pieces too large for the crusher may be removed and broken up before feeding. Also, excess clay can be removed and tramp iron may be picked out, both of which have a tendency to cause slipping and retard production.

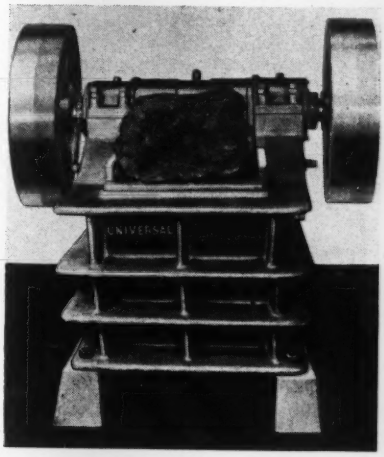


Fig. 1. Avoid feeding rock into the crusher that is too large to slide into the machine. Never use a sledge hammer to break a rock in the crusher while it is running.

Fig. 2. Reverse crusher jaws when they have become worn. The worn jaws will not grab and crush the material, consequently production is lessened.

Reverse jaw plates

Most of the overhead eccentric type and many other crushers have reversible jaws that can be turned end for end when the lower part becomes worn. Worn jaws will not grab and crush material, thus continued use of such equipment results in decreased production. Worn plates can be restored by build-up welding by skilled workmen using manganese steel filler bars and welding rod produced for this use. Precautions should be taken to avoid overheating and warping. On some machines provision is made for reversing jaw wedges and check plates, which should be done when wear indicates loss of production.

Another precaution—don't overfeed! When a crusher is run too fast, the jaws will not grip the rock. This causes slippage, cuts output and results in excessively rapid wear of jaws. There is a peak speed above which production actually decreases, therefore, it is desirable to operate at not greater than the manufacturer's recommended speed for efficiency and minimum wear.

Lubrication is important

The dust and grit of a crusher plant make lubrication and protection of bearing surfaces most important. Bronze bearing crushers should be inspected at least four times daily and a regular schedule of inspection is necessary with roller-bearing machines. Bearings should be checked for overheating, and lubricating vents wiped off before adding new grease. Bearings should be occasionally flushed with a thin oil such as SAE-10 (but never use kerosene on bearings).

A burlap bag or waste saturated with crankcase drainings placed on top of the toggle plate of the crusher will aid in keeping out dirt and grit and help to lubricate the bearing. The sliding surfaces of adjustment wedges and the screws should be oiled regularly and kept clean. If the adjustment screws are exposed, tie a piece of cloth around them to keep out the grit.

Check regularly the lubrication chart that comes with your crusher and follow its dictates. Pump out a shot of grease from the gun to clean the nozzle before attaching to grease vents and be careful not to over-oil or grease as too much lubricant can "smother" the bearings. It is poor

policy to add oil and grease continually, change it occasionally.

Once a day, preferably in the morning before starting up, tighten all loose nuts and bolts and check them occasionally through the day. Places to watch are the jaw wedge, wear plate, bearing cap, pitman and foundation bolts. Loose parts cause friction or pounding and result in rapid wear or breakage.

Be sure the movable jaw is centered so that it does not rub either cheek; eliminate any side play in bearings; check crusher for level so that rock does not gravitate to one side. Do not raise the adjusting wedge too high in an effort to get fine crushing, and use a longer toggle when necessary. The adjustment necessary for crushing smallest "fines" is to close jaws until they touch lightly and then slack them off a little for clearance. The time to adjust the jaws for size is when the crusher is running empty.

Fig. 3. Use a longer toggle rather than drawing adjusting wedges high when crushing fine. Adjust jaws for size when crusher is running empty.

Months of Planning and Practice Preceded Attack on German Dams

Information recently released by the British Air Ministry through the British Information Services sheds additional light on the methods employed in the damage, by bombing, to German dams that released most of the water stored for industrial uses in the Ruhr and Weser Valleys (*ENR*, June 17, p. 890). This reveals that months of planning and extensive field practice in England preceded the attack.

In addition to immediate damage done in the path of the floods, there is said to have been even more important "consequential" damage. This term is used by the Air Ministry to describe damage to supplies and facilities essential to industries.

If such extensive damage was possible, question has been raised as to why the raid was not staged earlier. The answer to this is threefold: (1) seasonal timeliness, (2) availability of planes of the right type and (3) necessary precision and skill of personnel.

The best time for the attack would be after the spring runoff, when the reservoirs would be full, and before the summer drought. Last year at that time the necessary planes, equipment and the personnel were not available.

An unsuccessful attempt to damage an Italian dam with torpedo-carrying aircraft proved that the great thickness of these dams (more than 100 ft. of concrete at the base) precluded any great success with torpedos. Immediately after that attack on an Italian dam the Germans provided their dams with torpedo nets and mounted heavy concentration of low flak on important dams.

British experts decided that the only way to force a breach in one of these massive structures was to develop means of applying a series of rapid and heavy, high explosive "pushes" *under water* against the upstream side of the dam. The missile decided upon was the sea mine because it has a greater weight of explosive in proportion to weight of case than does the bomb. There were also fusing and aiming difficulties with bombs.

Then, too, it was necessary to have planes of a type that could release a whole "stick" of mines. In fact, the need was for several aircraft in succession, each delivering explosives whose effect would be cumulative.

In planning the attack for this year it was decided to use 19 Lancaster bombers with crews trained to make the attack from as low a level as possible. This called for a program of special training to develop unprecedented skill and accuracy. The wing commander of this flight went in to the attack only 20 ft. above water level and most of the following aircraft were at this same height. Despite the most careful timing, the aircraft themselves were in danger from the exploding mines. It is believed that some of the eight missing bombers were in fact destroyed by this cause.

An "unofficial" story is that one of the Lancasters was seen caught on an upflung tower of water 100 ft. high. In such an assault, split-second timing was necessary so that aircraft traveling at some 300 m.p.h. could place their explosives actually against the face of the dam.

At an airdrome selected for the purpose the bombers and their crews went through "endless practice and rehearsals." They practiced "till each aircraft could drop its dummy mines *between a pair of goal posts, beneath the crossbar and in line with the posts*. Therein lie the real reasons for the astounding success of this desperate venture. First the most meticulous planning and timing, second sheer perfection in practice and train- were used. These slabs span 20 ft.

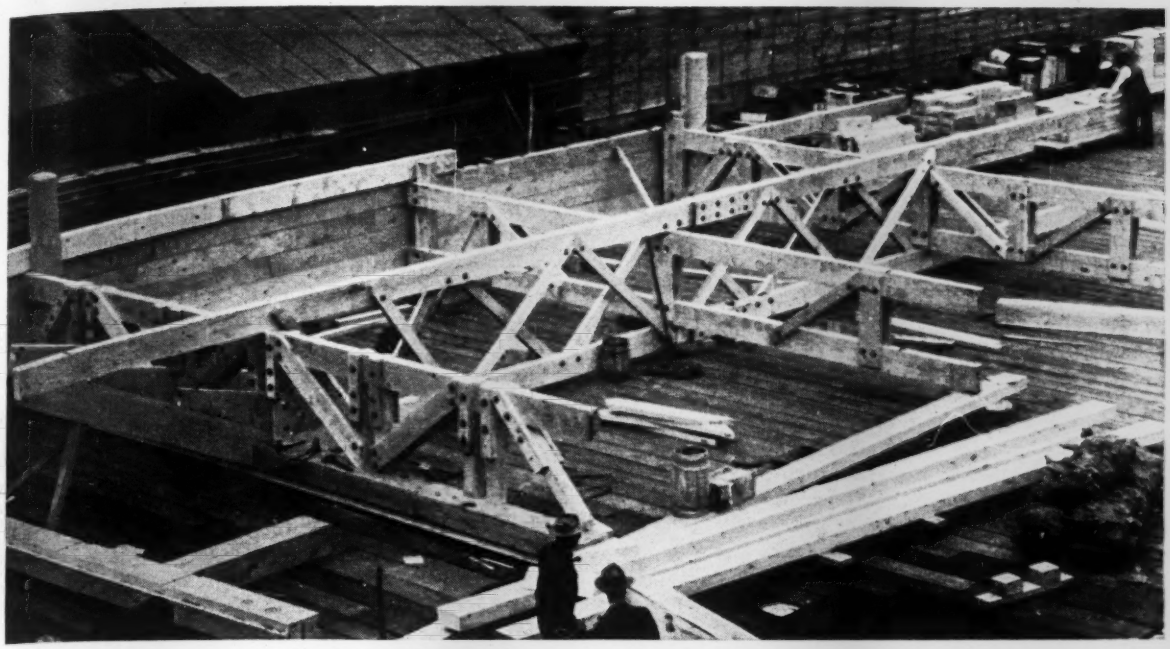


Fig. 1. Test assembly at the mill of 30x100-ft. "knock-down" barge with a 300-ton capacity.

Timber Barges Built for Easy Assembly

THE INGENUITY which is being applied to the problem of supplying all types of bottoms to meet our wartime demands is without parallel in our history. An example of this is evidenced by the ten timber barges of 300-ton capacity designed to meet unusual requirements recently built at Tacoma, Wash., and then shipped by rail and truck to a remote destination in the Alaskan interior. The high premium on manpower, particularly skilled labor, at the point where the barges had to be put together for use in river and lake service, made it necessary to keep down to a minimum all work involved in assembling the barges after the parts had arrived at destination.

Parts to be used after dismantling

Other stipulations were that shipping weights of the separate parts be kept low, that the work be done with all speed and also, since the barges would be needed only a short while, that materials should be available for other uses after dismantling.

Ten barges were required, 30x100 ft. in plan, with flat bottom, flat deck, vertical gunwales and raked ends. All bolted connections were made with split rings or shear plates. The deck was designed for a concentrated load at any point of 6,000 lb. and distributed load over any area of 1,200 lb. per sq.ft.

Fig. 2. Detail of framing (joints made with ring connectors) where flat bottom meets raked end.

The design adopted substituted longitudinal trusses for the usual interior bulkheads of solid timber. Five of these trusses, each 100 ft. long, were required and they were placed on 5-ft. centers. Top and bottom chords of the trusses were made of 6x16-in. timbers. Intermediate deck beams and fifteen transverse trusses were put on outside the longitudinal trusses to receive deck and bottom planking.

Field caulking eliminated

To eliminate field caulking, deck and bottom were splined with $\frac{3}{4}$x$\frac{1}{2}$-in. soft pine. Decking, 3x8's, and bottom 4x12-in. timbers were spiked on. At the raked ends 6x18-in. shaped knees strengthened the joints between bottom and the raked surface.

The ten barges, aggregating 580,000 b.ft., were fabricated and loaded on railroad cars within 33 days after receipt of the contract. The work was carried out by the Henry Mill & Timber Co., of Tacoma, Wash., for the Bechtel-Price-Callahan Corp.

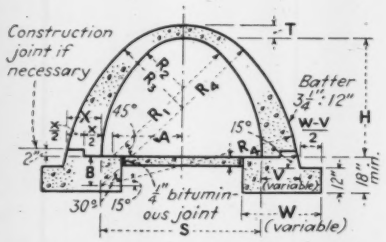
From Field and Office

WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRACTORS

Airfield Storm Sewer Built of Unreinforced Concrete

A steel-free highway culvert design was recently adopted for storm drains at a naval airbase in Tennessee. The Tennessee State Highway Department developed the plain concrete culvert design, which eliminated the use of critical materials.

Collapsible inside forms featured the airbase job, where 2,500 ft. of 8x6-ft. and 8x7-ft. storm drains were constructed. The accompanying sketch and tables, taken from *Concrete Highways Magazine* indicate the adaptability of the design to various cross-sections.



Cross section through plain concrete culvert showing limit of dimensions listed in accompanying table.

Dimensions and Estimated Quantities for Plain Concrete Culverts*

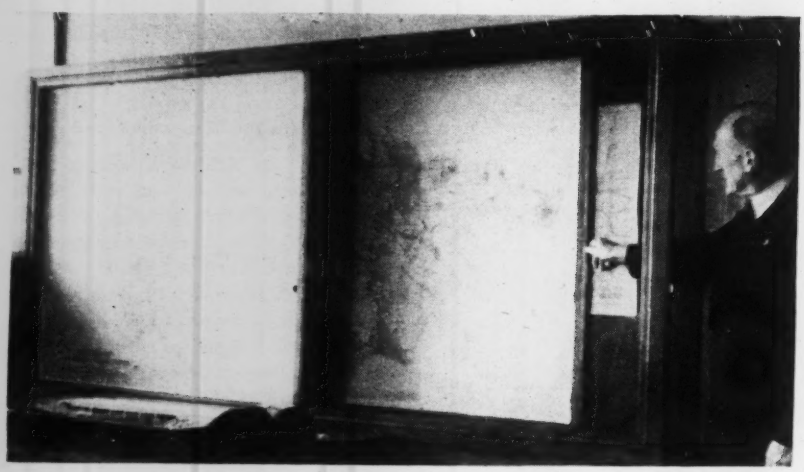
Span S	Rise H	Opening, Sq. Ft.	Arch Barrel									Concrete, Cu. Yd.	
			A	R_1	R_2	B	R_3	R_4	T	V	W	Per Ft.	Total
5′ 0″	4′ 0″	15.2	2′ 6¾″	5′ 0¾″	1′ 5¼″	0′ 3″	2′ 5″	5′ 11¼″	8″	1′ 2¼″	2′ 8¼″	0.671	41.4
6′ 0″	4′ 8″	21.3	2′ 10¼″	5′ 10¼″	1′ 9¼″	0′ 9″	3′ 1″	7′ 3¼″	8″	1′ 6¼″	3′ 0¼″	0.835	52.5
7′ 0″	5′ 4″	28.5	3′ 1½″	6′ 7½″	2′ 2½″	1′ 0″	3′ 7″	8′ 6¾″	9″	1′ 8¾″	3′ 2¾″	1.002	66.9
8′ 0″	6′ 0″	36.8	3′ 5″	7′ 5″	2′ 7″	1′ 6″	4′ 3″	9′ 10½″	9″	1′ 11½″	3′ 11½″	1.270	84.3
9′ 0″	7′ 0″	48.0	4′ 3¼″	8′ 9¼″	2′ 8¼″	1′ 5″	4′ 9″	11′ 1½″	10″	2′ 3½″	4′ 3¼″	1.565	109.7
10′ 0″	8′ 0″	60.7	5′ 1½″	10′ 1½″	2′ 10½″	1′ 3″	5′ 1″	12′ 1¾″	10″	2′ 4¾″	4′ 4¾″	1.776	134.9

* Quantities based on minimum length of 38 ft. 6 in. and footing depth of 1 ft. 6 in. Dimensions V and W based on footing depth of 1 ft. 6 in. For spans where S = 5 to 7 ft., $W = V + 1$ ft. 6 in. and for S = 8 to 10 ft., $W = V + 2$ ft.

Handy Map Mounting for Office Wall

A simple method of mounting maps for display on office walls, uses 4x5-ft. pieces of plywood or wallboard within ¾-in. frames, each with a knob on the right-hand vertical edge.

The frames slide in grooves that serve as guides along top and bottom, the grooves having a length twice that of each frame. There are ten frames in the assembly here shown, all housed in a cabinet that projects out from the wall only about 12 in. A door at the right-hand edge permits withdrawing any frame from its grooves.



Ten sliding frames, in rack two frames wide, can have maps attached on both sides.

By putting the frame back with the opposite face turned outward, the area available for mounting maps can be doubled. In such a mounting the maps are never rolled and any one of the frames can be instantly withdrawn to be placed on a drawing board or conference table.

This map cabinet was devised by S. V. Cortelyou, district engineer, California Division of Highways, Los Angeles.

Length of Pipe on Reverse Curve

Sir: In *ENR* March 11, 1943, p. 374, Samuel Levine emphasized the simplicity of finding the length of a reverse bend in a pipe, and illustrated the method with a diagram.

Using the same diagram (reproduced on opposite page) and the same nomenclature, I find that c is not necessary and the relation between remaining parts are given as follows:

$$T = R \tan \frac{a}{2} \quad (1)$$

$$b = 2T + (2T + d) \cos a \quad (2)$$

and $$a = (2T + d) \sin a \quad (3)$$

whence $$d = \frac{a}{\sin a} - 2T$$

(Note: This last equation is a correction to the value given in Mr. Levine's equation.) And finally $l = \pi R \frac{a}{180}$ and total length, $L = 2l + d$.

By combining Equations 2 and 3 it can be shown that

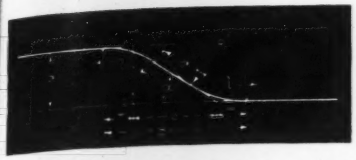
$$2T = b - a \cot a$$

This equation corresponds with Mr. Levine's Equation 5 and reduces to $T =$

$$\frac{b - a \cot a}{2} = R \tan \frac{a}{2}.$$

Now consider the solution to Mr. Levine's sample problem where the values given are: $a = 24$; $b = 48$; and $a = 30$ deg. Then $T = 24 - 20.7846 = 3.2154$;

$$R = \frac{3.2154}{.26795} = 12;$$



Reverse pipe problems can be solved quickly if accompanying formulas making use of above nomenclature are employed.

$$d = \frac{s}{\sin\alpha} - 2T = \frac{24}{0.5} - 6.4398 = 41.5692;$$

$$l = 2\pi = 6.2832, \text{ and}$$

$$L'_4 = 2l + d = 4\pi + 42.5692 = 54.1356]$$

All the author's equations are plain, linear equations and there is no need for resorting to profuse half-angle functions or quadratics, nor will one make frequent mistakes.—MANOUG N. DONEGIAN, *Associate civil engineer, U. S. Coast guard, 1015 Alaska Bldg., Seattle, Wash.*

Magnet Reduces Punctures on Industrial Plant Job

Three tons of nails and scrap metal per week was gathered up by a magnet suspended from the end of a truck that was operated on the roadways and wherever pneumatic-tired vehicles went during construction operations on a large industrial plant. Although nails constituted a large percentage of the material gathered, there were also wire clippings, pieces of conduit and metal scrap of all descriptions.

The truck was operated on the basis of six 10-hr. days per week. Operation was expensive because of the union requirement that a helper ride with the driver. The pay was $1 per hour for driver, 87½¢ for the helper and the daily 2 hr. of overtime was paid for at time and a half. Including rental for the outfit, this made the cost of the truck operation about $900 per month.

This cost was justified by reason of tire scarcity and insufficient spares for the fleet of about 400 pneumatic-tired units needed on construction at this plant. Tires out of service for repair of punctures, of which there were 65 to 70 per day at the height of the work, threatened to interfere with necessary transportation and justified the expense of magnet truck operation.

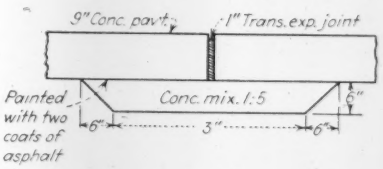
The mechanism consisted of three magnets suspended from the rear end of the truck body a few inches above ground surface. The magnet coils were spread so that any material responding to magnetic influence would be picked up from a roadway width equal to the outside-to-outside gage of the truck tires.

Tires used on this job were maintained by the transportation department of the general contractor, the McNeil Construction Co., Los Angeles.

Load Transfer Blocks Used in Cincinnati Pavement

Three major changes in municipal concrete street paving at Cincinnati, Ohio, are increased slab thickness, elimination of reinforcing, and use of load transfer blocks at the transverse joints. With elimination of all reinforcing, the thickness of the slab was increased from 8 to 9 in.

In eliminating the steel at the transverse joints, a load transfer block, of the type shown by an accompanying sketch, was placed under the slab at each joint. The joints are spaced on 90-ft. centers; at 15-ft.



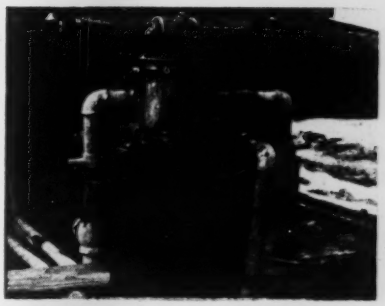
Load transfer blocks are being used at the transverse joints in municipal paving at Cincinnati.

spacing false joints consisting of a 2½x¾-in. asphalt filler are added. In the past, false joints were used on 20-ft. centers, but with elimination of the reinforcing in the slab, a more frequent spacing was recommended.

The changes to eliminate critical materials were worked out under the direction of H. H. Kranz, city engineer.

Unique Method Improves Compressor Cooling System

A locomotive-type air compressor, used to supply air for air-lifting water on a Texas construction project, was found to run hot. The trouble was ascribed to the setting of the unit, and for the fact that the midsummer heat frequently passed the 130-deg. mark. On days of excessive heat and when the prevailing breeze failed, the usual cooling fins on the air cylinder were unable to carry away the heat as fast as it was generated by full-load compression.



Trouble from this air compressor overheating was overcome by suspending the unit in water.

To step up the efficiency of the unit, a cylindrical tank mounting was built and the unit suspended in the tank at an elevation slightly above the topmost line of the cooling fins. A water supply line with proper control valve delivered water from the supply pumped by the air-lift, allowing it to flow into the tank and to be wasted through an overflow nipple near the rim of the container.

By "pinching" on the water stream, it was possible to obtain any desired degree of cooling of the pump. Operating conditions were found to be greatly improved.

For servicing, the entire unit was disconnected and lifted vertically out of the tank. Unions were provided in the air and steam lines to eliminate the need to break the pipe joints.—CHARLES C. LYNDE, *P. O. Box 1129, Houston, Texas.*

Pipe Culvert Headwall

Headwalls for pipe culverts on a Texas job are sloped slabs 4 in. thick laid on the ground. No forms are required other than a 1x4-in. ribbon strip on the sloping sides and a 1x6-in. strip at the top and bottom ends. Mixed concrete is hauled to point of use and placed dry enough to stand on the 1 to 1 slope. Only light mesh reinforcing is used.

The headwall pictured is on a Navy project, Brown-Bellows of Houston, Texas, contractor.

Book Notes and Reviews

The month's addition to the engineer's reading and reference list

Sound Views on Camouflage

THE ART OF CAMOUFLAGE—By Lieut. Col. C. H. R. Chesney. 252 pp. The Studio Publications, 381 Fourth Ave., New York. $2.75.

Much sound common sense is packed into the sections on camouflage for civil works in this book. Being a British publication, part of the text is devoted to discussion of the official British A.R.P. Handbook No. 11. This does not, however, detract from the value of the general observations. Much emphasis is laid on the need for considering the three dimensional factor in the camouflage of large civil structures, shadows playing an important part in camouflage studies for such buildings.

Nearly half the book is devoted to what the author calls "strategic camouflage, or the camouflage of military intention," which is a discussion of how noted military leaders like Napoleon and Stonewall Jackson deceived their adversaries, a subject that appears to have no place in such a text other than to increase its size.

Geodetic Surveys

GEODETIC CONTROL SURVEYS—Second Edition. By H. Oakley Sharp. 132 pp. John Wiley & Sons, New York. Price $3.50.

Prof. Sharp's new book, "Geodetic Control Surveys" fills a real need for up-to-date information on this specialized field of surveying, commensurate with the growing importance of control surveys and accurate maps.

The first edition of this book appeared in 1940 under the title of "Elements of Geodetic Surveying," published in lithoprint form. Three years' use in lithoprint form has resulted in a general improvement in the second edition.

Inasmuch as control surveys are an important part of photographic surveying this text is arranged in format and style to be a companion volume to the author's already published "Photogrammetry."

The size of this book, 8¾x11¼ in., requiring a 12-in. bookshelf for vertical stacking, will be looked upon by some students as an objectionable departure from customary sizes of surveying texts. This size, however, has permitted the use of generous margins that will be welcomed by those in the habit of making notes in their books.

Sharp's "Geodetic Control Surveys" is an important and timely contribution to surveying literature that ought to be in the library of all organizations and individuals interested in precise surveying.—*Reviewed by* PAUL P. RICE, *Assistant Professor of Civil Engineering, Lafayette College, Easton, Pa.*

Financing Public Work

THE NEW PHILOSOPHY OF PUBLIC DEBT—By Harold G. Moulton. 93 pp. The Brookings Institution. Washington, D. C. $1.

THE two opposing philosophies with respect to financing public undertakings that dominate the thinking in Washington economic circles are discussed in this small and very readable book. The author, a well-known economist, sides with what he calls the traditional view of public finance, along with officers of the U. S. Treasury and the Federal Reserve System, the President and many members of Congress. They hold that a rapidly rising public debt imperils the financial stability of the nation. The "new conception" of public finance is held by many individuals within the Roosevelt Administration, notably, A. A. Berle, Assistant Secretary of State, and Alvin H. Hansen, economic adviser to the National Resources Planning Board. The latter hold that a high internal public debt is a national asset and that deficit spending is essential to economic stability within the nation.

Mr. Moulton holds that no effective postwar planning for both public and private work can be done until the issue is settled as to which of these philosophies is to prevail. Private enterprise, he says, cannot make any progress in its plans for reabsorption of returning soldiers and war workers and for maintenance of a high level of employment without a solid foundation on which to build, which foundation the "new conception" does not supply. Similarly, government planning for adequate employment immediately following the war is virtually impossible, he declares, while these conflicting views exist within the government. Mr. Moulton's little book is well worth the few hours required to read it.

Construction Men in War

HE'S IN THE ENGINEERS NOW—By Carl Mann. 224 pp. Robert M. McBride & Co., 116 East 16th St., New York, N. Y. $2.50.

IF YOU ARE LOOKING for inspiration, something to lift you out of the rut of daily routine, get a copy of "He's In The Engineers Now." It is by far the best book that has been written about the part played by engineers in the present conflict. This is due in part to the author's style and to the fine illustrations, and in part to the fact that the War Department has permitted the author to give more information concerning the part played by engineers in the Tank Destroyer Command, the Engineer Amphibian Command and the Army Air Forces than could be revealed before the invasion of Africa. The only activities not well covered are the training of general service regiments (*ENR* July 1, p. 29) and the railroad building and operating regiments.

Much of the book relates to the training of engineer officers and engineer troops at Fort Belvoir and most of the illustrations are pictures taken there. The principal exception is the work of engineer troops on the Alcan Highway.

One cannot read this book without a deeper realization of the varied and difficult part that construction men are playing and will play in war on the scale that it is conducted today.

New Engineering Books

THE ENGINEER'S MANUAL OF ENGLISH—By W. O. Sypherd, Alvin M. Fountain, and Sharon Brown. 503 pp. Scott, Foresman and Co., Chicago. $2.50.

SHELTER TREES IN WAR AND PEACE—By Ephraim Porter Felt. Orange Judd Publishing Company, Inc., New York. $2.50. 306 pp.

(*Continued on page* 154)

Management
—Heart of America's Industrial Progress

In Peace and War, Management Men and Methods Steer Production on a Steady Upward Course

WHEN the Allied armada of 2,000 ships, protected by a vast umbrella of planes, struck the coast of Sicily, Axis leaders more had reason to wonder how "that decadent, pleasure-ng America" had swung from the manufacture of automobiles, erators and costume jewelry to equipments of war, and had produced such mighty plants as the Krupp, the Fiat and the works—and had done it so quickly.

merica at war is in the lead just as it has led a world at e. Super-performing planes are taking to the air at the present of nearly 100,000 per year. Ships, to carry the war to our es, slide down the ways at the rate of two a day. Tanks, guns, ammunition are pouring out of our "peace" plants greater volume than the entire Axis effort can possibly War expenditures in 1943 alone will reach the staggering of approximately $83,000,000,000—an amount equal to ntire national income for 1929. Added to this is the rock m output of essential civilian goods—a very considerable

his unprecedented production is taking place while some 0,000 men and women, those physically best equipped, have n called to the armed forces. Many of them were taken from stry, and their loss could be repaired only by more efficient pment and more effective methods.

rigorous training programs had to be superimposed upon other abnormal problems facing industry in its high-speed nversion from stoves to boats; from printing machines to guns; m automobiles to airplane engines; from fishing tackle to ght sights.

This phenomenal task was further complicated by the need rapid expansion. A modest machine tool industry had to be anded to handle a volume many times its normal capacity. eel production had to be increased by 20%, and that of alumi-um and magnesium multiplied over and over. From almost nil, demand for high octane gasoline soared to unbelievable quan-ties. The creation of synthetic rubber and electronic industries necessary almost overnight.

Who deserves credit for these accomplishments? All industry! he engineers, chemists, designers, skilled workers, common borers. But over and above all it belongs to *management*.

In industry it is mandatory to have a directive force to co-dinate the efforts of men in the use of materials and the plication of power toward the production of goods and services. he application of this directive force is the function of manage-ent, and only because we had today's kind of management were ble to transform ourselves, almost overnight, from a peace-ing nation to the world's greatest producer of implements of r. As a nation, we had been preparing for a long time to play part in world affairs. This preparation, certainly not planned today's objectives but none the less effective, began some four des ago.

With the advent of the twentieth century, the character of industry in the United States, and, therefore, the character of American living, began to change. Scientific management was born. Frederick W. Taylor brought into focus and showed how to use effectively those processes and procedures upon which our present-day mass production is based. He was followed by Harrington Emerson, who made the industrial world acquainted with efficiency in manufacture and the remarkable progress to be gained therefrom in the field of production, with its consequent price reductions and wider distribution of industry's products. There followed, in industry, an alert management, a capable management, a management with vision. Without it, the work of Taylor and Emerson would have gone for naught.

It is because of this early work of management—and the extraordinary developments it produced—that the country as a whole, and particularly those employed in industry, were not over-awed by the seemingly impossible job of quick conversion to all-out war production. But let us look back four decades and examine some of those preparatory accomplishments which have proven so vital to the progress and welfare of the nation.

From 1900 to 1939 (the last pre-war year), total employment of all kinds increased 52 per cent; in the manufacturing industries alone the increase was 84 per cent. *The nation became definitely industrial.*

In 1900 the average wage earner was able to spend only 20.2 per cent of his income for things other than necessities; in 1930 his buying power for non-essentials had increased to 34.8 per cent. *The average man acquired confidence in what industry could do.*

In 1900 the average work week was 56 hours; in 1930 it was 48 hours. *The burden of production was being transferred from man to machine.*

In 1939 the United States possessed 30 per cent of the world's railroads, 72 per cent of its automobiles, 49 per cent of its telephones. *The nation's production equipment had grown to formidable proportions.*

In 1939 nearly half of the families in the United States owned their own homes, 64 million individuals carried life insurance policies and 45-million had savings accounts. National income had increased 300 per cent from 1900 and during the same period the proportion of national income paid out in salaries and wages increased from 58 to 70 per cent. And in less than this period (1914–1939) the purchasing power of the wage rate increased by 60 per cent. *There had been evolved the kind of living for which men will work—and fight.*

Since 1900, factories increased their output of goods from $11,000,000,000 to $60,000,000,000 in 1939. This increase of nearly 450 per cent was accomplished while the country's population rose only 60 per cent. In this same span of years, technological developments and improvements in methods had

increased the value added by manufacture per wage earner by 200 per cent, and the horsepower per factory worker had been multiplied by 2½. *The nation's production plant was ready to assume its gigantic wartime job.*

During this period of industrial and national evolution, management itself had changed. Prior to the advent of scientific management, our goods and services were the product of several kinds of directive activities, varying from the strictly paternalistic to the ruthless. There was little conception of the responsibility that industry now broadly acknowledges — the responsibility of trusteeship in the interest of stockholders, employees and the public — specifically; in the interest of our national economy — generally. Acceptance of this stewardship is acceptance, also, of the belief that, in the long run, no industry, and no unit or industry, that does not serve society can live.

Have the actions of management caused the times to change? Or has an alert management been successful only because it has changed with the times? Certainly, the industrial concern of 1900 would not thrive under the conditions of today. Just as certainly the new things that industry has in store for a waiting postwar world will have a far reaching effect upon the times.

Management today seldom owns the factory or the business it manages. It is hired to perform the coordinating, directive functions. It is free to change — of itself, or with the times. Management therefore exercises its power through leadership in executing ideas . . . not through ownership.

This is the fourteenth of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.

Good management can be sustained only in an environment sympathetic to its aims. It has an undeniable obligation to society, because it must be a compatible part of the social structure or be rejected by that structure as a whole.

An environment sympathetic to its aims means, also, that industry, in the very serious reconstruction period ahead, will not be at full effectiveness if it is subjected to attacks by government no matter what the underlying reasons may be — over-zealous devotion to a cause, lack of understanding or just plain politics. It was to industry — to industrial management — that the government turned when our existence as a free nation was threatened; it is to industrial management that government must turn in order to win the peace.

This statement is made in the sincere conviction that what has made America strong is industry's ability to produce consistently more and more goods and services for more and more people. It is only by actually creating them that we built up our stockpiles of the necessities of life. And it is only by creating them that we can have more of those things that make life worth while. These become available to more people as industry succeeds in getting greater output of goods and services for a given input of human energy, materials and power.

And what of the physical jobs ahead? In this country alone, there will be an immense demand upon industry to supply the things people have been unable to purchase during the war. Today the nation is wearing out not only its automobiles, refrigerators, vacuum cleaners and radios, but its very houses, its roads, railroads, and airline equipment. It is saving its money while whetting its appetite. Truly, the calls the American people will make upon industry in the postwar period will be many and insistent.

This demand can be viewed in another light. Economists say there will be 56,000,000 persons seeking gainful employment after the war. The Committee for Economic Development has estimated that $140,000,000,000 worth of goods and services will be required each year for those people. Compare that with our actual output of $97,000,000,000 worth in 1940 when gainful employment was 46

These future jobs will be done if industry too much hampered by government in industry performs its function in the Management in government performs its *regulating* things. The best cooperation of agement will be necessary in the postwar much of the regulatory kind will interfere that does things.

Industrial management must improve, too if it does not recognize definitely the trust job, if it does not understand and live up bilities, then it will be risking all for which following suggestions are made to indicate management's self-improvement can take

Evolution in management been too slow in some Management is undoubtedly too prone to see the in technological while being blind Looking at industry progress as a whole, there no doubt as to the nological improvement jobs. It elevates the living. But that of no satisfaction to the who loses his job because machine or a new method quired one less man. But this is an evil that management can do something about.

Management has been careless of its opportunities regard to labor. On that account the pendulum of social readment has swung too far. Labor has been given extensive power without corresponding responsibility.

Industrial management has been too slow to abandon its of letting the buyer beware. As a result of this, industry is over regulated.

Management has been too slow in recognizing its responsi to promote the economic philosophy that a society cannot for consumption what it does not produce. A companion cational item too long neglected is management's obligation the field of public relations.

In these years since 1900, industrial management has growing. Perhaps many of its experiences have been but gr pains. Management has learned, among other things, the lutely vital need for capital at the right time and in the amount. It has learned to use some of its earnings as money" in the introduction of new products and the improved processes. It has learned to invest more and more in research. It has learned of the interdependence of industry and agriculture. And it has learned much about the eternal triangle of and labor and government.

With such a history and such experiences behind it, I every faith that management is going ahead to even more glorious accomplishments in the winning of the war, and I believe that its peacetime accomplishments to come are beyond the power of any of us — even management itself.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

Without batteries...war machines are useless!

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CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

HIGHWAY PAVING, TENNESSEE

OWNER: Tennessee Dept. of Highways and Public Works, Nashville, Tenn.

PROJECT: Concrete paving and improving 18.9 miles of highways between Shelbyville and Kirkland in Bedford, Rutherford and Williamson Counties, Tenn. Pavement is plain cement concrete, 7-in. uniform. Project includes roadway and drainage excavation along with minor quantities of culvert excavation, structure concrete, concrete curbing, and 18-in. pipe for culverts.

CONDITIONS: Contractor to furnish all materials and complete work in 130 working days. Rail and highway transportation facilities available. Prevailing wage rates are: skilled labor, $1.25 to $1.50 per hour; semi-skilled, 75c. to $1.00; and common labor, 35 to 50c.

BIDS: Seven bids were received May 28, 1943, ranging from the contract low of $541,131 to $651,910. Awarded May 29.

LIST OF BIDDERS:

1. M. T. Reed Constr. Co., Belzoni, Miss. (contract) $541,131
2. Pittman Constr. Co., Atlanta, Ga. 575,483
3. J. B. Michael Co. and H. E. Wolfe Constr. Co., Nashville, Tenn. 591,738
4. Foster & Creighton Co., Nashville, Tenn. 603,845
5. Bowyer & Johnson, Jackson, Tenn. 608,323
6. Stacey Bros. Co., Johnson City, Tenn. 634,931
7. George O. White, Chattanooga, Tenn. 651,910

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Roadway and drainage excavation	43,912 c. y.	$0.42	$0.39	$0.30
2. Culvert excavation, unclassified	3 c. y.	1.00	5.00	2.00
3. Plain cem. conc. pavmt. (7-in. uniform)	254,795 s. y.	2.05	2.19	2.27
4. Class B concrete	1.3 c. y.	32.00	50.00	35.00
5. Concrete curb	5.9 c. y.	48.00	40.00	17.50
6. 18-in. pipe culvert	101 l. f.	3.00	4.00	2.50

HIGHWAY BRIDGE, VIRGINIA

OWNER: Public Roads Admin., Federal Works Agency, Arlington, Va.

PROJECT: Construction of northbound and southbound reinforced concrete bridge structures, Bridge No. 102, on Henry G. Shirley Memorial Highway, Arlington, Va., at crossing over Glebe Road. Involves necessary structural excavation, concrete, reinforcing steel, structural steel, damp-proofing, and an untreated timber bridge railing.

CONDITIONS: Contractor to furnish all materials and complete work in 150 calendar days. Hydraulic hydrated lime to be added to the concrete used in the exposed surfaces of bridges; it amounts to 6-lb. for each bag of cement required. Rail and highway transportation facilities available. Wage rates are: skilled labor, $1.50 to $2.00 per hour; semi-skilled labor, 90¢ to $1.50; and common labor, 87½¢. Preference rating for project is AA-3.

BIDS: Twelve bids were received June 8, 1943, ranging from the low of $83,654 to $117,870.

LIST OF BIDDERS:

1. Capital Excavating Co., Inc., Washington, D. C. (low bidder) $83,654
2. Simonsen & Emerson Corp., New York, N. Y. 84,742
3. Guy H. Lewis & Son, Lynchburg, Va. 90,981
4. National Structures Corp., New York, N. Y. 95,784
5. Potts & Callahan Contg. Co., Inc., Baltimore, Md. 95,835
6. Lakeside Constr. Co., Asheville, N. C. 99,015
7. David Vecellio, Roanoke, Va. 101,800
8. Baltimore Contractors, Baltimore, Md. 108,820
9. Tompkins Constr. Corp., New York, N. Y. 110,315
10. Troitino Constr. Co., Alexandria, Va. 111,593
11. Bowers Constr. Co., Raleigh, N. C. 112,685
12. Laurence J. Rice, Forest Hills, N. Y. 117,870

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Unclass excavation, structures	3,300 c. y.	$3.00	$3.31	$2.00
2. Concrete, class A	120 c. y.	14.00	17.125	15.00
3. Concrete, class D	2,060 c. y.	24.00	23.00	20.00
4. Reinforcing steel	365,000 lb.	.055	.061	.055
5. Structural steel; furnished, fabricated and erected	7,000 lb.	.145	.165	.12
6. Damp-proofing	110 s. y.	.75	1.08	.60
7. Untreated timber railing	790 l. f.	1.85	1.07	2.00

DAM AND DIVERSION CHANNEL LOS ANGELES, CALIF.

OWNER: Los Angeles County Flood Control District, Los Angeles, Calif.; M. E. Salsbury, acting chief engineer.

PROJECT: Constructing Rubio Debris Dam and Las Flores Diversion Channel and appurtenant works in Rubio and Las Flores Canyons, Altadena, Los Angeles County, Calif. Dam to be earth fill; compacted; crest length 600-ft.; thickness at base 350-ft.; riprap on upstream face of dam; rectangular gravity concrete channel, 2,000-ft. long, 16-ft. wide, 8-ft. deep.

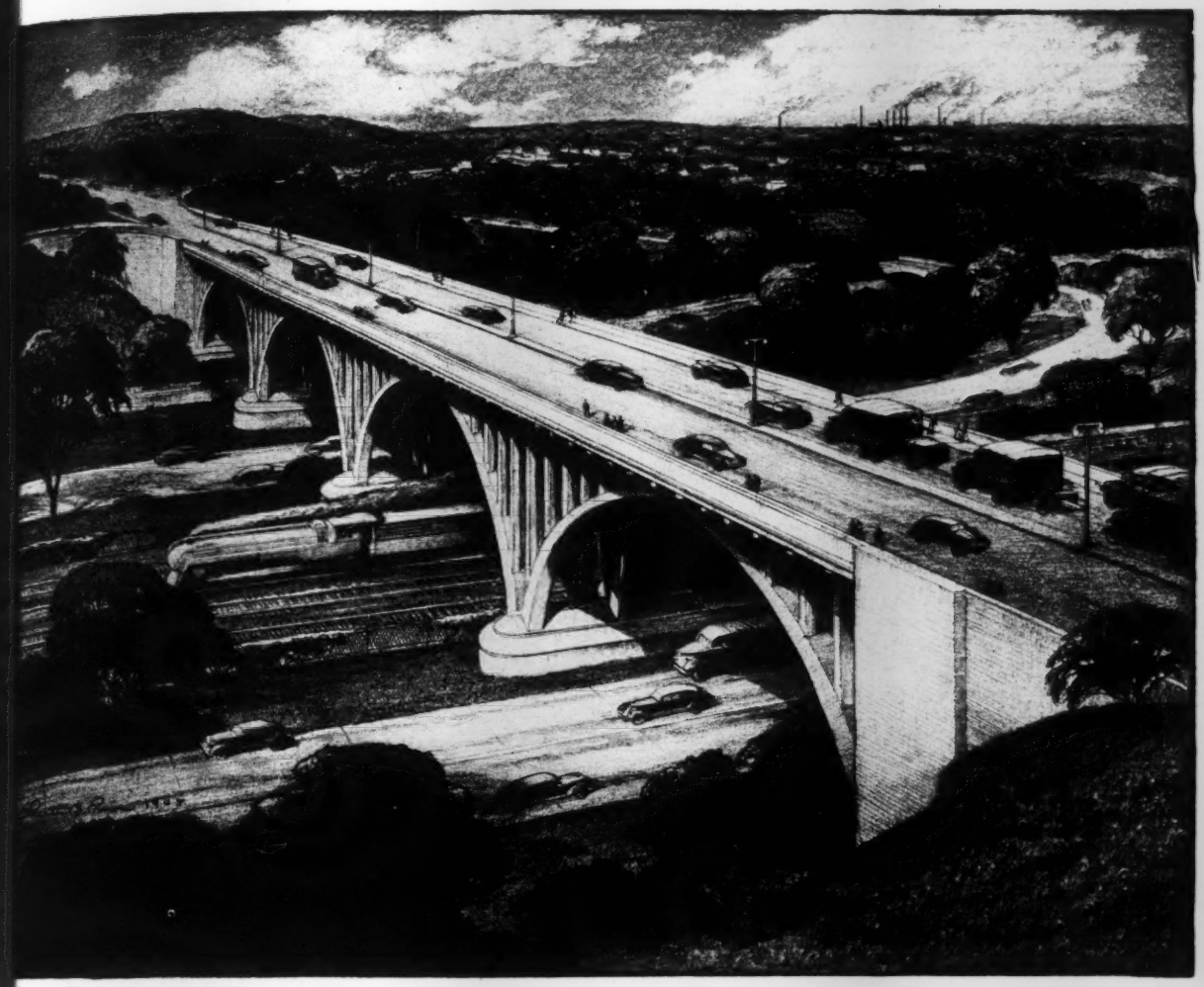
CONDITIONS: Cement, cement admixtures, concrete blocks, stock for form spacer bolts, tie wire; pipe inserts, roofing paper, asphaltic paint, asphaltic joint fillers, and all metal and hardware to be furnished by the owner. Contractor to furnish all other materials and complete work in 180 calendar days. Highway transportation available to project site. Wage rates are: skilled labor, $1.50 per hour; semi-skilled, $1.35; and common, 87½¢.

BIDS: Nine bids were received June 22, 1943, ranging from the contract low of $308,789 to $419,127.

LIST OF BIDDERS:

1. J. E. Haddock Ltd., Pasadena, Calif. (contract) $308,789
2. C. G. Willis & Sons, Inc., Los Angeles, Calif. 315,085
3. Baruch Corp. and J. A. Thompson & Son, Los Angeles, Calif. 326,183
4. Vinnell Co., and Engineers Ltd., Alhambra, Calif. 334,709
5. Rhoades Bros. and Shofner, Los Angeles, Calif. 337,203
6. Morrison-Knudsen Co., Inc., Los Angeles, Calif. 361,047
7. R. E. Campbell, Aliso Village, Calif. 396,268
8. L. E. Dixon, Los Angeles, Calif. 416,648
9. Frontier Constr. Co., and Bert Calvert, Los Angeles, Calif. 419,127

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Remove obstructions	Lump Sum	$2,200.00	$4,750.00	$1,757.00
2. Clearing and grubbing	Lump Sum	17,000.00	9,600.00	1,721.00
3. Stripping	6,900 c. y.	.50	.54	.319
4. Excavation, basins and structures	99,300 c. y.	.65	.70	.533
5. Excavation in borrow pit	125,000 c. y.	.30	.48	.237
6. Compact fill and bkfill. (Rubio)	99,540 c. y.	.14	.15	.151
7. Comp. fill and bkfill. (Las Flores)	4,300 c. y.	.19	.15	.151
8. Each additional roller trip	175,000 sq.	.0125	.01	.014
9. Rubio, access roadfill (Las Flores)	4,050 c. y.	.14	.20	.152
10. Wetting Zone 3	540,000 c. f.	.007	.005	.007
11. Uncompacted fill, Zone 3 (Rubio)	39,270 c. y.	.04	.07	.072
12. Uncompacted bkfill., structures	4,870 c. y.	.50	.25	.144
13. Grout rock paving (Rubio-Las Flores)	600 c. y.	6.75	3.00	7.21
14. Rock facing (Las F.), rock bl., Zone 5	7,280 c. y.	4.00	.75	5.05
15. Rockfill, outlet tower (Rubio)	720 c. y.	5.30	1.00	8.66
16. Rockfill, Las Flores, channel end	85 c. y.	4.25	3.00	8.65
17. Asphaltic concrete gutters	3,815 s. f.	.20	.15	.157
18. Class A concrete	5,700 c. y.	10.25	12.44	13.62
19. Class B concrete	5,360 c. y.	7.50	8.30	11.96
20. Class C concrete	588 c. y.	16.00	14.18	13.76
21. Class D concrete	180 c. y.	31.00	21.00	22.11
22. Place outlet tower above base	Lump Sum	350.00	110.00	577.00
23. 6-in. b. & s. concrete pipe drains	1,320 l. f.	.50	.21	.72
24. 8-in. b. & s. conc. pipe drains	2,130 l. f.	.55	.22	.72
25. 4-in. b. & s. conc. pipe drains	570 l. f.	.45	.25	.72
26. Gravel backfill for drains	1,055 c. y.	3.75	4.90	6.82
27. Install 36-in. outlet pipe	456 l. f.	1.50	1.15	1.08



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LONE STAR CEMENT for substructure where there's time for curing and hardening . . . 'INCOR' in the superstructure, where dependable 24-hour service strengths permit streamlining of construction schedule with 50% to 60% less forms . . . sound practice today, with both time and lumber at a premium.

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MATERIALS AND LABOR PRICES

Market quotations on construction materials and wage rates reported monthly by ENR correspondents

INCREASES IN LUMBER prices and labor rates are the most important changes in the *ENR* construction list for August. Short-leaf Southern pine is $3.00 to $4.00 higher in Atlanta, and $2.00 to $4.00 higher in most sizes in St. Louis. Long-leaf yellow pine is up $1.00 in St. Louis, and $2.00 higher in Atlanta. Douglas fir prices are unchanged from a month ago and plywood remains at July levels.

Bricklayers' rates are 12½c. per hour higher in Cleveland and San Francisco. The carpenters' rate, which formerly ranged from $1.125 to $1.25 in Birmingham, is now $1.25 per hour. Common labor rates formerly ranges from $1.00 to $1.25, whereas $1.00 per hour for Montreal rates are mixed, with all skilled trades except Common labor on heavy construction is up. These changes the fluctuation in the cost of living bonus according to the Exchange.

Only minor changes are recorded for cement, gravel, and steel products.

CEMENT, AGGREGATES, READY-MIXED CONCRETE—F. O. B. CITY

	PORTLAND CEMENT Per bbl., C/L lots, incl. 40c. per bbl. for bags, cash dis. not deducted			SAND AND GRAVEL Per ton, carload lots			CRUSHED STONE Per ton, carload lots		CRUSHED SLAG Per ton, carload lots, f.o.b. plant		CONCRETE BLOCK 8x8x16-in.; truck del.; per block		READY-MIXED CONCRETE 1:2:4, over 50 c.y., del
	Cloth *a*	Paper	Bulk	Gravel, 1½ in.	Gravel ¾ in.	Sand	1½ in	¾ in	1½ in.	¾ in.	Sand-grav.	Lt. wgt. Agg.	per c.y.
Atlanta	$2.77	$2.52	$2.47	$1.79	$1.89	$1.99	$1.79	$1.89	$1.59	$1.69	$0.16	.....	$8.00
Baltimore	2.33	2.08	1.88	1.75‡	1.75‡	1.25‡	1.75‡	1.75‡	1.75‡	1.75‡	.125	$0.125*e*	7.25
Birmingham	2.50	2.25	2.10	1.75	1.75	1.50	.85	1.00	.90	1.15	.1425	.....	5.80
Boston	2.75*b*	2.40*b*	2.30	1.40‡	1.40‡	1.00‡	1.40‡	1.40‡	....	....	.165	.165*e*	7.25*m*
Chicago	2.70	2.45	2.30	2.15‡*d*	2.15‡*d*	2.15‡*d*	2.15‡*d*	2.15‡*d*	1.75‡	1.75‡	.16	.16*z*	.....
Cincinnati	2.31	2.06	1.81	1.20	1.20	1.10	1.80	1.80	....	....	.12	.15*ff*	6.60
Cleveland	2.40	2.15	....	1.70*i*	1.70*i*	1.60*i*	1.70*i*	1.70*i*	1.75*i*	1.75*i*	.14	.14	7.30*n*
Dallas	2.52	2.27	2.07	1.50*p*	1.70*p*	1.10*p*	1.69*p*	1.79*p*	....	....	.15	.....	6.20
Denver	3.08	2.88	2.68	1.20	1.40	1.25	1.65	1.75	1.00	1.00	.15	.15*ff*	7.25
Detroit	2.39	2.14	1.99	1.65	1.65	1.20	1.63	2.00	2.20‡	2.45‡	.12	.14*ee*	6.50
Kansas City	2.58	2.33	2.18	1.85	2.30	1.00	1.91	1.91	....	....	.125	.125*ag*	7.50*n*
Los Angeles	2.80*v*	2.70*v*	....	1.30	1.30	1.15	1.30*f*	1.30*f*	....	....	.04*bb*	.10*aa*	7.25
Minneapolis	2.90	2.65	....	1.00*h*	1.00*h*	.25*h*	1.00*h*	1.00*h*	....	....	.12	.16	7.10*j*
Montreal	....	1.95*rs*	1.79*rs*	....	1.65‡*t*	2.05‡*t*	1.05‡*t*	1.15‡*t*	....	....	.14*c*	.14*ee*	7.90*a*
New Orleans	2.41	2.16	1.96	1.65	1.65	.90	....	....	....	....	.19	.....	9.25
New York	2.69‡	2.44‡	....	1.60*de*	1.60*de*	.90*de*	1.70*de*	1.80*de*	....	....	.14*cc*	.14*eee*	7.50*k*
Philadelphia	2.33	2.08	1.88	1.55‡	1.65‡	1.20‡	1.90	1.95	1.10	1.10	.155	.155*ee*	8.20
Pittsburgh	2.44	2.19	1.99	1.40‡	1.40‡	1.70‡	2.25‡	2.25‡	1.50	1.50	.17	.17*z*	8.25
St. Louis	2.80	2.52	....	1.75‡	1.50‡	1.25/1.50‡	1.10*h*	1.10*h*	.75*g*	.75*g*	.125	.105*ee*	8.00
San Francisco	....*u*	2.22	1.92	1.36	1.36	1.36	1.46	1.46	....	....	....	.20*aa*	7.55
Seattle	2.95*o*	2.75*o*	....	1.00*o*	1.00*o*	1.00*o*	2.00*o*	2.00*o*	....	....	.16	.16*y*	7.25

‡ Delivered. *a* 10c. allowed for each returnable bag. *b* 10c. per bbl. off for cash. *c* Plus municipal tax. *d* Per cu. yd. *e* Barge lots alongside docks. *f* Crushed granite. *g* F.o.b. Granite City, Ill. *h* F.o.b. plant. *i* Within three miles of Public Square. *j* 5% discount for cash. *k* Discount of 2 percent for cash in 10 days. *l* Up to 200 cu.yd. *m* 50c. off for cash. *n* 25 c.y. or more. *o* 2% off for cash. *p* 10c. per ton off cash 15 days. *r* 10c. per bbl. off, cash 20 days. *s* 8% sales tax included. *t* 8% sales tax not included. *u* Price withdrawn. *v* 20c per bbl. discount; 20c. allowed for returnable cloth bag. *w* Cinder. *x* Waylite. *y* Havdite. *z* Celocrete. *aa* Pumice. *bb* 4 x 8 x 12 in. *cc* Also 8 x 18 x 18 in.

CASH DISCOUNTS CEMENT to Contractors: truck delivery, 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash discount 10c. per bbl. for payment within 15 days of date of invoice. Subject discount 10c. per bbl. 20 days in Montreal.

CURRENT MAXIMUM PRICES RECEIVED AT CEMENT MILL

Charge for bags not included. For cloth bags, add 40c. per bbl.; 10c refund allowed for each returnable bag; for paper bags add 15c. per bbl., not refundable.

	Bagged	Bulk		Bagged	Bulk		Bagged	Bulk
Buffington, Ind.	$1.70	$1.65	Ironton, Ohio	$1.60	$1.55	Richard City, Tenn.	$1.80	$1.75
Dallas, Tex. (Inc. 9c. tax)	1.84	1.79	Limedale, Ind.	1.70	1.65	Steelton, Minn.	1.80	1.75
Hannibal, Mo.	1.70	1.65	Norfolk, Va.	1.75	1.70	Universal, Pa.	1.65	1.60
Hudson, N. Y.	1.75	1.70	Northampton, Pa.	1.55	1.50	Waco, Tex. (Plus 9c. tax in Tex.)	1.75	1.70
Independence, Kans.	1.70	1.65	North Birmingham, Ala.	1.70	1.65	Montreal (8% sales tax incl.)	1.68	1.67
						Discount 10c per bbl. 20 days		

PAVING BRICK, BLOCK, ASPHALT, ROAD OILS—F. O. B. CITY

	PAVING BRICK AND BLOCK Granite per M. lots of 50,000 4x4x8 in.	Brick per M 3x4x8½ in carload lots	Wood per sq. yd 3½ in. 16-lb. treat	PAVING ASPHALT Per ton, less than 80 penetration Tank car	Drums	ASPHALT BINDERS—FLUXES Per gal., 80–300 penetration Tank car	Drums	CUTBACK ASPHALT Per ton Tank car	Drums	ROAD OIL Per gal. Tank car	ASPHALT EMULSION (Quick-breaking) Per gal. Tank car	Drums
Atlanta	$73.00	$39.35	$2.25	$18.40*a*	$24.62*a*	$0.0787*e*	$0.1309*a*	$0.0876*hr*	$0.1348*h*	$0.0676*a*	$0.0826	$0.1384
Baltimore	150.00‡	48.00	80.00*m*	15.00*r*	21.00*r*	06*r*	.09*r*	13.00*r*	23.00*r*	.065*r*	.07*r*	.14*r*
Birmingham	150.00	48.00	.....	17.95	....†	0747	....†	.0834*h*	....†	065	.09	.....†
Boston	80.00	57.00	3.75	14.20	20.00	06	.09	.065*h*	.115*h*	065	.09‡	.12‡
Chicago	150.00	55.00	1.80/2.00*d*	14.00	22.50	13.00*g*	21.50*g*	.0575*h*	.15*h*	05*n*	.09/.10*n*	.13/.15*n*
Cincinnati	118.00	37.50	.....	16.40	.....	085	.....	12.25	.....	.07	.085	.....
Cleveland	118.00	37.50	2.25	19.00	20.00	09	105	.10*h*	.15	.105	.09	.093
Dallas	.....	36.00	.....	13.65	20.30	06	11	16.00	24.80	.06	.05/.07	.07/.09
Denver	.....	27.50	.....	11.00	.....	10.00	.....	.0475*h*	.....	.....	.....	.....
Detroit	.....	37.50	.....	18.06*r*	25.60*r*	.0743	.128	.0718*h*	.119*h*	067	.0755	.1149
Kansas City	.....	40.00	.....	18.50	23.50	.077	.1075	077*h*	.107*h*	.057	.11	.15
Los Angeles	.....	50.00	.....	9.00*b*	23.00	9.50*bg*	24.00*bg*	9.50*b*	.....	.025	.072	.15
Minneapolis	.....	.....	2.30*d*	.....	27.70	.....	126	.....	32.64	.....	.....	.....
Montreal	.....	.....	.....	16.60*k*	24.25*k*	.116*k*	1485*k*	.115*kk*	.135*kk*	.08*h*	135*k*	.183*k*
New Orleans	.....	.....	.....	13.50*a*	20.00*a*	.057	.088	.06*h*	.095*h*	.....	.080	.....
New York	.....	70.00	.....	17.40	24.20*p*	14.00	.....	.0725*h*	1325*hp*	.....	.0725*p*	.1225*p*
Philadelphia	130.00	58.00	4.05	15.00*r*	.....	14.00*r*	.....	.065*hr*	.....	.....	14.00*gr*	.....
Pittsburgh	135.00	38.75	.....	18.00	23.00	.09	.16	20.00	36.00	.07	.06	.11
St. Louis	.....	37.00	.....	16.00	22.00	15.00*g*	21.00*g*	.0575*h*	.1213*h*	.648	.0525	1125
San Francisco	.....	70.00	.....	9.50	18.75	9.50*gr*	18.00*gr*	10.00	17.50*r*	9.50*gr*	.0525	1125
Seattle	.....	60.00*c*	.....	10.90*s*	19.40*s*	.....	20.40*gs*	11.40*s*	.....	10.90*s*	.0525*s*	.0625*s*

‡ Delivered. *a* F.o.b. Baton Rouge. *b* Delivered to purchaser's warehouse. *c* 3½x4x8½ in. *d* 2½ in 12-lb. treatment. *e* Local reduction due to 20% reduction intra-state class freight rates, only Georgia affected. *f* Mexican. *g* Per ton. *h* Per gallon. *i* F.o.b. Martines. *j* 3x3½x8½ in. *k* Tax included. *m* Per thousand. † Available on priority only and quoted specially. *p* No steel drum shipments except to armed forces. *r* February 1943 prices, none later available.

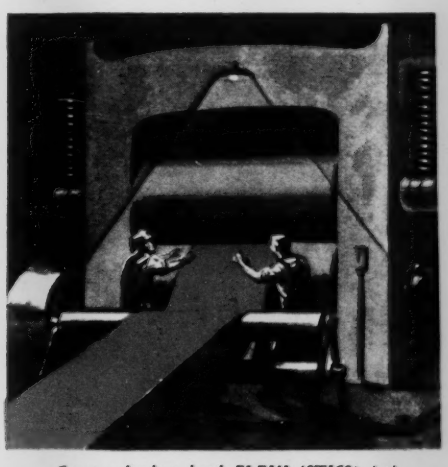
MANHATTAN FLEXLASTICS*

Bring Tomorrow One Day Nearer

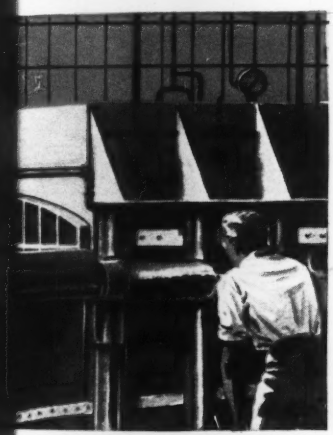
for users of Industrial Rubber

*manufacture is a blending of art and At MANHATTAN, it begins with a tomatic mixer blending the right ingredi- correct proportions to assure ultimate ASTICS.**

*Great rolls "plasticize" the mixture to give it uniformity and homogeneity. Skill and experience must join hands with formulae, equipment and engineering to deliver the lasting service of FLEXLASTICS.**



Great calendars bond FLEXLASTICS intimately to the built-in strength members at MANHATTAN. These may be of fabric or specially twisted cord or metal, or combinations of these.*



ting FLEXLASTICS to give lasting calls for close controls, skill and a long und of experience. Different techniques quired for different FLEXLASTICS.*

THE use of "manufactured" rubbers—commonly termed as synthetic rubber—is by no means a temporary expedient.

The special-purpose synthetic rubbers—as used in MANHATTAN Paranite-G.O.P. products—have become well established in many applications where they render superior service to natural rubber.

They are the fruit of long experience and of the same pioneering policy which made MANHATTAN the first American rubber manufacturer to initiate a continuous program of research in the industrial applications for the special-purpose synthetic rubbers then available.

To this long experience in the art of compounding and processing all available types of rubber was added the knowledge of how to make and where to place *built-in strength members*—acquired by engineering research and protracted service tests. . . . This was an additional ingredient to the 250-odd from which more than 1,000 different MANHATTAN compoundings derived increased strength, greater flexibility, cohesion and elasticity—to such a degree that it justified the coinage of a new term—FLEXLASTICS.*

The word "engineered"—long used by MANHATTAN—is well supplemented by this term "FLEXLASTICS*" so descriptive of the qualities essential in rubber products that have to deliver service under war strain.

FLEXLASTICS* is the assurance that the "engineered" characteristics are in every MANHATTAN flat or V-belt; conveyor or elevator belt; air, steam, water or other type hose; or other item regardless of the kind of rubber from which it is now made.

Condor PRODUCTS

Chute Lining
Launder Lining
Industrial Brake Blocks and Lining
Molded Rubber Goods

Rubber Lined Tanks
Rubber Covered Rolls

Abrasive Wheels
Bowling Balls

50 YEARS OF RESEARCH *For a business to have lived 50 years and grown continuously, is evidence of vitality and vision. The zealous preservation of that vitality and vision to be applied to production, service and research, is the obligation which management at MANHATTAN has inherited from its founders. FLEXLASTICS* are another stage in the discharge of that obligation.*

*The term FLEXLASTICS is a MANHATTAN trade mark. Only MANHATTAN can make FLEXLASTICS.

THROW YOUR SCRAP INTO THE SCRAP!

AHEAD WITH MANHATTAN

THE MANHATTAN RUBBER MANUFACTURING DIVISION
of RAYBESTOS-MANHATTAN, INC.
EXECUTIVE OFFICES PASSAIC, NEW JERSEY

IRON AND STEEL PRODUCTS—BASE MILL PRICES

	STRUCT. SHAPES-PLATE	REINF. BARS ¼-in billet *b*	RIVETS ½-in. structural	WIRE NAILS Base *d*	SHEET PILING Base	STEEL RAILS Per Gross Ton Standard	Light	Re-rolled	TRACK SUPPLIES Angle Bars	Std. Spikes *c*	Plates
Birmingham	$2.10	$2.15	$3.75	$2.55	.....	$40.00	$40.00	$39.00	$2.70	$3.00	$2.15
Chicago	2.10	2.15	3.75	2.55	$2.40	40.00	40.00	39.00	2.70	3.00	2.15
Pittsburgh	2.10	2.15	3.75	2.55	2.40	40.00	40.00	39.00	2.70	3.00	2.15
Buffalo	2.10	2.15	.....	.....	2.40	.....	.....	.....	.....	.....	2.15
Cleveland	2.10	2.15	3.75	2.55	.....	.....	.....	.....	.....	.....	.....
Youngstown	.....	2.15	.....	.....	.....	.....	.....	.....	.....	3.00	.....
Detroit	.....	2.27‡	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gulf ports	2.47*a*	2.52*a*	.....	.....	2.85*a*	.....	.....	.....	.....	.....	.....
Pacific ports	2.75*a*	2.80*a*	.....	.....	2.95*a*	.....	.....	.....	.....	.....	.....

‡ Delivered. *a* F.o.b. cars dock. *b* Rail steel same as billet prices. *c* Other basing points include Portsmouth, O., Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., and Pacific coast ports, on tie plates alone; Steelton, Pa., on spikes alone, Lebanon, Pa., Richmond, Va. *d* Add switching charge SIR per cl.

IRON AND STEEL PRODUCTS—F.O.B. WAREHOUSE, PER 100 LB., BASE PRICE

	STRUCTURAL SHAPES Per 100 lb. base price	REINFORCING BARS* Per 100 lb., ¾ in., base price 15 tons or over *b* New billet	Rail steel	Add Switch	$/cwt. for Del.	EXPANDED METAL LATH Per 100 sq.yd., carload lots Std. diamond mesh, 3.4 lb	Std. ribbed 3.4 lb.	WELDED FABRIC REINFORCING Per 100 sq.yd., carload lots 4x16 in., No. 5 & 10 wires	4x12 in., No. 8 & 12 wires	6x6 in., No. 6 & 6 wires Per sq. yd.	SHEET PILING Per 100 lb. Base price
Atlanta	$2.34	$2.39	$2.39	$.02½	$.10	$21.06	$23.00	$1.82	$1.35	$0.1719	$3.04
Baltimore	3.70	2.90	2.75	.....	.10	22.50	24.50	1.70	1.27	.1611	3.00
Birmingham	2.10*a*	2.15	2.15	.02½	.10	19.00	21.00	1.80	1.34	.1701	.....
Boston	3.85	3.51	3.36	$20 C.L.	.10	18.50	29.50	1.76	1.31	.1656	2.70
Chicago	2.10*a*	2.15	2.15	.03	.05	21.50	23.50	1.67	1.25	.1575	2.40
Cincinnati	3.68	2.53*cd*	2.53*cd*	.....	.05	19.50	21.50	1.66	1.25	.1566	.....
Cleveland	2.10*a*	2.15	2.15	.02½	.10	19.50	21.50	1.66	1.25	.1566	.....
Dallas	4.25	3.17	3.17	.....	.....	25.00	27.50	1.93	1.42	.1827	.....
Denver	4.35	3.95	3.85	.....	.....	26.50	28.50	1.97	1.45	.186	.....
Detroit	3.65‡	2.52‡	2.52‡	.....	.10	25.50	29.50	1.68	1.26	.1584	2.66
Kansas City	4.00	2.61*cd*	2.61*cd*	.0	.05	24.50	26.50	1.78	1.33	.1683	2.89
Los Angeles	3.65*f*	2.575	2.425	.02½	.05	23.00	27.50	1.93	1.42	.1827	3.65
Minneapolis	3.81‡	2.73	2.73	.0	.10	25.00	27.00	1.80	1.34	.1701	2.73*d*
Montreal	4.00*i*	2.90*i*	2.80*i*	.....	.....	26.00*hij*	33.00*hij*	2.56*i*	3.14*i*	.268*i*	.....
New Orleans	4.40	2.52	2.52	.05	.10	21.50	23.50	1.82	1.35	.1715	2.875
New York	3.75	2.76*c*	2.76*c*	.....	.15	17.50	19.50	1.76	1.32	.1665	2.74
Philadelphia	3.66	3.82	....	.....	.....	19.50	21.50	1.71	1.28	.1611	2.72
Pittsburgh	2.10*a*	2.15	2.15	.02½	.10	23.00	26.50	1.59	1.20	.1503	2.40
St. Louis	3.697	2.74	2.74	.0	.05	28.00	34.00	1.69	1.27	.1692	2.70
San Francisco	4.35	2.825	....	.02½	.10	21.00	24.50	1.93	1.42	.1827	3.85
Seattle	2.75*e*	2.80*e*	....	.....	....	34.50	38.50	1.93	1.42	.1827	2.95*g*

‡ Delivered. *a* Mill prices. *b* 5–15 tons, add 15c. 1–5 tons, add 25c. Less than 1 ton, add 50c. *c* 20 tons or over Base. *d* Mill price plus freight to f.o.b. dock. *f* Includes delivery in free delivery zone. *g* Less than 1 ton, add 25c.; 1 to 5 tons, add 10c. * High scrap steel prices cut former 15c. differences between new billet and rail steel in many mills. *h* List price. *i* Plus Dominion and Province sales tax. *j* August 1942 price; not on market.

PLUMBING, HEATING, WATER, SEWER AND DRAIN PIPE

	C. I. PIPE Per net ton f.o.b. 6 in. to 24 in.*a*	VITRIFIED SEWER PIPE Per foot, std. 8 in., s.s.	Delivered std. 12 in., s.s.	ASTM 24 in.,	C13–35 36 in.,	CLAY DRAIN TILE Per 1,000 ft., carload lots, f.o.b. 6 in.	8 in.	CONCRETE SEWER PIPE Per ft., delivered; ASTM C 14–35 12 in.	24 in.	WROUGHT STEEL PIPE Full standard weight, *k* 1 to 3 in., Butt Weld Black %	Galv. %	3½ to 6 in., Lap Weld Black %	Galv. %
Atlanta	$49.66	$0.26*b*	$0.468*bc*	$1.8525	$4.68*c*	$85.00	$128.00	$0.45	$1.642	48.2	54.2	59.7	51.2
Baltimore	53.00	.35	.60	2.65	7.25	160.00	200.00	.50	1.75	65.5	57.5	63.0	54.5
Birmingham	45.00	.275	.495	1.95	5.50	100.00	220.00	.50	1.70	62.2	54.2	59.7	51.2
Boston	55.40	.26	.463	2.07	5.85	140.00	.....	.60	.....	....	....	....	....
Chicago	54.33	.35	.675	2.70	7.00	100.00‡	150.00	.45	1.85	66.0	55.0	64.5	53.0
Cincinnati	53.27	.231	.4455	1.80	5.125	105.00	170.00	.60	1.70	57.1	43.4	54.0	39.6
Cleveland	54.75	.196	.378	1.62	4.715	81.00	125.00	.30	1.60	68.5	57.5	66.0	54.5
Dallas	56.43	.31	.58	2.25	5.00	90.00	110.00	.46	1.57	59.9	51.9	57.3	48.3
Denver	61.56	.29†	.52†	2.16†	3.00*n*	130.00	240.00	1.00	2.22	58.4	50.4	55.7	47.2
Detroit	54.75	.252	.486	2.09	7.16	78.00	127.00	.36	1.60	57.7	44.0	54.8	40.6
Kansas City	55.73	.315	.39	2.20	5.86	140.00	260.00	.45	1.60	35.9	46.4	46.6	59.9
Los Angeles	68.40	.282†	.508†	2.034†	5.085†	115.50	192.50	1.00	2.00	61.1	50.1	58.6	47.1
Minneapolis	59.00	.275†	.495†	1.98†	5.37†	.....	.....	.90	2.10	64.2	53.2	60.7	49.2
Montreal	60.00	.85*o*	1.50*o*	5.25*p*	8.50*ep*	45.00*m*	64.00*m*	.48*m*†	1.92*m*†	....	....	....	....
New Orleans	51.78	.26	.48	1.69	.....	150.00	220.00	.45	1.65	62.4	54.4	58.8	50.3
New York	52.40	.322	.621	2.43	6.15	.....	.....	.60	1.40	64.9	53.9	62.4	50.9
Philadelphia	51.00	.28	.54	2.30	6.75	150.00	225.00	.45	1.75	56.6	42.8	53.6	39.1
Pittsburgh	56.00	.245†	.4725†	1.845†	5.4325	97.80	154.20	.85*q*	2.00*q*	68.5*i*	57.5*i*	66.0*i*	54.5*i*
St. Louis	52.84	.28	.504	2.016	4.50	85.00	220.00	1.00*j*	2.15*k*	56.4	42.6	52.5	38.4
San Francisco	68.40	.3625*d*	.6525*d*	2.61	6.52	115.50	192.50	.58	2.34	45.0	31.0	41.0	26.0
Seattle	70.20	.375	.675	2.70	6.75	84.00	187.50	.51*f*	1.44*f*	....	....	....	.....

‡ Delivered. †F.o.b. *a* B. & S. class B and heavier, C/L lots, 200 tons and over Burlington, N.J. (base) $49.00. Based on existing freight rates; subject to rate change. Gas pipe and class A, $3 per ton additional, 4 in., $3 per ton additional, 30 in. and larger usually $2 per ton less. *b* Double strength. *c* List to dealer. *d* List. *e* 30-inch. *f* Less 5% for cash. *g* Culvert pipe. *h* Discounts from standard list consumers carload prices, except Pittsburgh prices are f.o.b. mill. Base price $200 per net ton. List prices per ft.; ¾ in., 8½c.; 1 in., 11½c.; 1 in., 17c.; 2 in., 37c.; 2½ in., 58½c.; 3 in., 76½c.; 4 in., $1.09; 6 in., $1.92. 3 percent tax on transporation costs not included. *i* Applies also at Lorain, Ohio, mills. Chicago delivered base is 2½ points less on butt, 1½ on lap. Freight is figured from Pittsburgh, Lorain, O., Chicago Dist. Billing is from point producing lowest price at destination. WROUGHT IRON PIPE: Base price and list prices per ft. same as wrought steel pipe. Discount for Pittsburgh base: Butt-weld—1 in. and 1¼ in. black 34, galv. 16; 1½ in. black 38, galv. 18½; 2 in. black 37½, galv. 18. Lapweld—2½ in. to 3½ in. black 31½, galv. 14½; 4½ in. to 8 in. black, 32½ galv. 17. *j* Reinforced; spec. C 76–37. *k* Reinforced; spec. C 75–37. *l* Plus sales tax. *m* Tax included. *n* 27-in. pipe. *o* Less 50%. *p* Less 53%.

Somewhere in...

GW FIGHTERS *write to* GW WORKERS

From the far corners of the earth! From all fronts, friendly letters are being mailed by fighting buddies (formerly GW war workers) to their working comrades in GW plants. Hundreds of GW employees are with the armed forces . . . the letters they send are incentives for GW workers to speed war production.

Following are parts of letters written by former Gar Wood employees now at the fighting fronts, to their war-worker friends:

NORTH AFRICA . . . I saw GW Winches pulling big trucks out of the mud . . . GW Wreckers towing in wrecks . . . GW Bodies taking a lot of abuse . . .
Pfc. Norman Byron

WITH THE BOMBARDIERS . . . a big GW Crane lifting a training plane and loading it on a trailer . . . worked slick, too . . .
Pvt. Paul Milligan

SOUTH PACIFIC ISLAND . . . our truck is equipped with a GW Winch . . . proving a "life saver" to the camp personnel . . .
Pvt. W. Hailman

TERRITORY OF HAWAII . . . GW equipment seems to be everywhere . . . saw GW equipment every place I have been . . .
Sgt. George Beaudain

ALASKA . . . our trucks have GW Winches in front . . . lots of GW Cargo Bodies . . . and GW Mobile Machine Shop Bodies on trucks . . .
Pvt. Joseph Fink

U. S. AIR BASE . . . I have seen GW Road Scrapers and Roadbuilders . . .
Pfc. Robert M. Silvey

HOISTS AND BODIES

ROAD MACHINERY

TRUCK CRANES

MOTOR BOATS

TRUCK TANKS

GUN CARRIAGES

BALLOON WINCHES

TRUCK WINCHES

THEY GIVE THEIR LIVES—
YOU LEND YOUR MONEY

Protect Freedom
BUY
WAR BONDS
for Victory!

GW

GAR WOOD INDUSTRIES, Inc., Detroit

LUMBER, TIMBER PLYWOOD—PER M FT., B.M., CARLOAD LOTS F.O.B.

	SHORT LEAF YELLOW PINE AND DOUGLAS FIR — All S. L. Y. P. is No. 2 common or better and for No. 1 N. C. Box. (Prices in Bold Face)									LONG LEAF Y. P. Merchantable grade up to 20 ft.		PLYWOOD Rail freight increment (See note for base price)
	All Fir planks No. 2 common, Fir timber is No. 1 common. Lengths up to 20 ft. (Prices in italics)											
	1x6 S4S	1x8 S4S	2x4 S4S	2x6 S4S	2x8 S4S	2x10 S4S	3x12 Rgh	6x12 Rgh	12x12 Rgh	2x12 Rgh	12x12 Rgh	
Atlanta	**$37.00**	**$37.00**	**$32.00**	**$31.00**	**$31.00**	**$34.50**	**$49.00**	.....	.....	**$58.00**	**$66.00**	$17.35 $21.45
Baltimore	**40.00**	**43.00**	**40.00**	**40.00**	**41.00**	**45.00**	**60.00**	.....	.....	**110.00**	**115.00**	18.35 22.25
	48.00	*48.00*	*52.00*	*52.00*	*52.00*	*52.00*	*68.00*	*$70.00*	*$70.00*	.....	.....	....
Birmingham	**34.50**	**36.50**	**32.00**	**32.00**	**34.00**	**34.00**	**53.00**	**53.00**	**56.00**	.....	.....	17.35 21.15
[1]	37.50	37.50	37.00	37.00	37.00	43.00	65.00	.....	.....	67.50	70.00	....
Boston [2*]	40.00[3]	40.00[3]	50.00[3]	55.00[3]	60.00[3]	65.00[3]	75.00[3]	.....	.....	80.00[3]	.....	18.25 22.25
[2*]	*45.00*	*45.00*	*50.00*	*55.00*	*60.00*	*70.00*	*75.00*	*80.00*	*80.00*	.....	.....	....
Chicago	**43.00**	**44.00**	**40.00**	**39.00**	**40.00**	**41.50**	**60.00**	.....	.....	80.00	95.00	14.60 17.80
	60.00	*60.00*	*47.50*	*47.00*	*47.00*	*48.00*	*57.00*	*56.00*	*58.00*	.....	.....	....
Cincinnati	**41.00**	**42.50**	**39.00**	**40.50**	**42.00**	**43.00**	**53.00**	.....	.....	65.00	68.00	17.35 21.15
	.....	.....	.....	.....	.....	.....	*55.50*	*55.50*	*55.50*	.....	.....	....
Cleveland	**42.50**	**42.50**	**52.50**	**51.00**	**51.00**	**54.00**	**78.00**	70.00	70.00	.....	.....	17.75 21.60
Dallas [e]	**41.50**	**42.50**	**38.50**	**37.50**	**37.50**	**38.50**	**53.50**	**53.00**	**53.00**	**78.00**	**83.00**	14.60 17.80
Denver [2]	54.00[4]	52.00[4]	55.00[4]	55.00[4]	55.00[4]	56.00[4]	59.00[4]	*73.00*	*79.00*	.....	.....	10.45 13.70
Detroit	**44.00**	**44.00**	**44.00**	**43.50**	**44.00**	**46.00**	**60.00**	.....	.....	53.00	63.00	17.35 21.15
	.....	.....	.....	.....	.....	*51.00*	*55.00*	*60.00*	*60.00*	.....	.....	....
Kansas City	**50.00**	**55.00**	**52.00**	**52.00**	**52.00**	**55.00**	**75.00**	.....	.....	**75.00**	**85.00**	12.60 15.40
	50.00	*55.00*	*55.00*	*55.00*	*55.00*	*56.00*	*75.00*	*80.00*	*80.00*	.....	.....	....
Los Angeles [a]	*55.00*	*55.00*	*53.00*	*53.00*	*51.00*	*51.00*	*57.00*	*65.00*	*68.00*	.....	.....	9.90[h] 12.10[h]
Minneapolis [2b]	49.00[4]	49.00[4]	.....	.....	.....	.....	.....	.....	.....	.....	.....	12.60 15.40
[2]	*53.00*	*53.00*	*53.00*	*52.00*	*52.00*	*53.00*	*59.00*	*61.00*	*61.00*	.....	.....	....
Montreal [2†]	*52.00*	*55.00*	*48.00*	*52.00*	*54.00*	*60.00*	.....	.....	.....	200.00	200.00	....
	42.50	*42.50*	*45.25*	*45.25*	*45.25*	*46.75*	*50.00*	*50.00*	*50.00*	.....	.....	....
New Orleans	**31.50**	**31.50**	**33.75**	**31.75**	**34.00**	**35.00**	**48.00**	.....	.....	69.00	69.00	14.60 17.80
	31.00	*31.00*	*33.00*	*31.00*	*34.00*	*32.00*	*33.00*	.....	.....	.....	.....	....
New York [2j]	**60.50**	**61.50**	**56.25**	**55.25**	**56.25**	**59.50**	**67.50**	.....	.....	120.00[f]	125.00[f]	18.35 22.35
[2]	.....	.....	*65.00[i]*	*65.00[i]*	*65.00[i]*	*65.00[i]*	[Range from $75 to $95]			.....	.....	....
Philadelphia	**53.00**	**53.00**	**52.00**	**51.00**	**51.00**	**54.00**	**74.00**	.....	.....	116.00	112.00	18.25 22.25
	[$60.00 to $75.00]		*65.00*	*65.00*	*65.00*	*65.00*	*67.50*	*$75 to $95*	*$75 to $95*	.....	.....	....
Pittsburgh	**50.80**	**53.20**	**62.75**	**55.00**	**60.85**	**62.50**	**76.25**	.....	.....	.....	.....	18.10 22.05
	69.20	*68.10*	*66.10*	*65.30*	*65.20*	*65.65*	*88.75*	*88.75*	*88.75*	.....	.....	....
St. Louis [2c]	**56.00**	**52.00**	**53.00**	**52.00**	**53.00**	**56.00**	**69.00**	*75.00*	*75.00*	86.00	85.00	14.60 17.80
San Francisco [d]	*55.50*	*55.50*	*57.00*	*57.00*	*56.50*	*56.50*	*40.50*	*49.50*	*49.50*	.....	.....	7.30[g] 8.90[g]
Seattle	*55.00*	*55.00*	*55.00*	*55.00*	*55.00*	*55.00*	*40.00*	*40.00*	*40.00*	.....	.....	0.00 0.00

Bold Face type, Southern Pine. *Italics, Douglas Fir.* [1] Long leaf. [2] Roofers' N. C. Pine. [3] Spruce. [4] Native. [5] Western Pine, No. 3 Common. [7] Spruce. [8] Norway Pine. ‡ Delivered. *a* Yard prices. *b* Contractors discount in Minneapolis and St. Paul discontinued May 21, 1938. *c* 5M ft. or less. *d* F.o.b. cars San Francisco freight rate. *e* 10% discount taken off. *f* Up to 18 ft. † Plus sales tax * Prices for truck delivery; no longer quoting carload lots f. o. b. city

Note: Special concrete form grade Fir Plywood, 4' by 8' panels, 5-ply, sanded 2 sides, water resistant glue, carload lots, delivered per 1,000 sq. ft. surface. Seattle base price on ⅝", $95.15; on ¾", $104.85; price includes oiling and sealing charges. For other centers add rail freight increment from table or proper size. For resin dipped treatment, add $10.50 per M. *g* Lower rate by water shipment *h* 50,000 lb. minimum. *i* Ranges from $65 to $69. *j* Average price

GLASS, EXPLOSIVES, CHEMICALS

	WINDOW GLASS — Discounts from jobbers list, Aug. 15, 1938 Single or Double Thickness A quality	B quality	EXPLOSIVES — Per lb. 40% Ammonia Gelatin in 50-lb. cases delivered in 200 lb. lots*
Atlanta	75%	75%	$0.15
Baltimore	77%	78%	.15
Birmingham	76%	76%	.105
Boston	77%	78%	.15
Chicago	77%	77%	.15
Cincinnati	77–10%	77–10%	.15
Cleveland	77–10%	77–10%	.19
Dallas	76%	76%	.1625
Denver	76%	76%	.155*e*
Detroit	77%	77%	.1575
Kansas City	76–10%	76–10%	.155
Los Angeles	86%*d*	88%*d*	.1575
Minneapolis	77%	77%	.155
Montreal	40–5%‡	47%‡	.1675†
New Orleans	70%	75%	.16
New York	81%	82%	.22*f*
Philadelphia	78%	79%	.15
Pittsburgh	79%	79%	1225
St. Louis	77–10%	77–10%	.155
San Francisco	66–15%	73–15%	155
Seattle	75%	75%	1575†

Price of 60% Ammonia Gelatin in $0.01 per lb higher than 40%

a Disc from list Sept. 1939. *b* Also less 6% tax exemption. *d* Discount from jobbers' list Sept. 15, 1928. ‡ Sales tax included.

* Urban prices influenced by service charges or local storage and delivery regulations, do not consistently reflect quantity prices in less congested areas *e* F.o.b. Louviers, Colo. *f* In boroughs of Kings, Queens and Richmond, and in Manhattan south of Canal Street, add delivery charge of $6.00 per trip † F.o.b.

40% Ammonia Gelatin price ranges in other than urban areas, per lb. (except Seismograph Grades)

	C/L 20,000 lb. net	Tons	200 lb. lots
E. of the Miss., except Fla. and Me.	$0.105	$0.13	$0.15
W. of Miss. to Rocky Mtn. States, Fla. and Maine	.11 –.1175	.135 –.1475	.155 –.1675
Rocky Mtn. States	.11 –.1225	.135 –.1525‡	.155 –.1725‡
Pacific N. W. States	.1075–.12	.1375–.15	.1575–.17
Pacific S. W. States	.1050–.1125	.135 –.1425	.155 –.1625

‡ F.o.b Louviers, Colo., or Butte, Mont.

PILES, TIES—F.O.B.

PILES

Prices per linear foot, pine, with bark on, f.o.b. New York; delivered from barge 1½ to 2c. per ft. additional

Dimensions	Points	Length	Short Leaf — Barge	Rail
12 in. at butt	6 in.	30 to 50 ft	...	$0.28
12 in.— 2 ft. from butt	6 in.	50 to 59 ft	...	.30
12 in.— 2 ft. from butt	6 in.	60 to 69 ft	...	.35
14 in.— 2 ft. from butt	6 in.	50 to 69 ft	...	.35
14 in.— 2 ft. from butt	6 in.	70 to 79 ft	...	.39
14 in.— 2 ft. from butt	5 in.	80 to 85 ft.	...	.50
14 in — 2 ft. from butt	5 in.	85 to 89 ft.	...	.55

RAILWAY TIES

Prices f.o.b., per tie for carload lots:

		6"x8"x8' Untr.	6"x8"x8' Tr.	7"x9"x8'6" Untr.	7"x9"x8'6" Tr.
Boston	Oak	$1.50	....	$2.00	....
	Pine	2.00	$3.00*a*	2.50	$3.50*a*
New York	S. L. Sap Pine	1.43/1.54	2.59	1.76	2.86
	Mixed Oak	1.71	2.59	2.42	3.58
Birmingham	White Oak	1.00	1.60*a*	1.30	2.25*a*
	Southern Pine	....	....	....	....
Chicago	Red Oak	....	2.19*a*	....	2.87/3.00*a*
	Southern Pine	....	....	....	....
Los Angeles	Douglas Fir	1.10	1.75*a*	1.60	2.50*a*
Philadelphia	Red Oak	....	2.10*ag*	....	3.25*ag*
St. Louis	White Oak	1.65*	....	1.90*	....
	Red Oak	1.55*	2.15*a**	1.90*	2.70*a**
	Sap Pine or Cypress	1.35*	....	1.70*	....
San Francisco	Douglas Fir	1.15*bef*	....	....	3.00*caf*
Montreal	Birch or Maple	.85	.95	....†	....†

Tr.— Treated; Untr.— Untreated. *a* Creosoted *b* 6"x8"x8'6". *c* Empty cell. *d* Zinc. *e* Green. *f* F.o.b. cars. † Out of market. * September 1942 price, OPA ceilings effective. *g* January price, none later available

CHEMICALS

Water, sewage treatment road work, f.o b. carlots, New York

Bleaching powder, in drums, f.o.b. works, per 100-lb	$2.50– 3.10
Chlorine cylinders, liquid, per lb. delivered	.0325
Calcium chloride, 77–80%, flaked, in 100-lb. paper bags, delivered, per ton	18.50–35.00
Silicate of soda, 52 deg., in drums, f.o.b. works, per 100 lb.	1.40
Soda ash, 58%, in paper bags, per 100 lb. dense	1.15
Sulphate of aluminum, commercial, in 100-lb. bags, per ton	23.00–25.00
Sulphate of copper, in bbl., per 100-lb	5.10

HAISS HI-POWER

FOR BIGGER PAYLOAD DIGGING

More load per grab, and more grabs per hour, day and week. Weight where it does the most good, and strength and stiffness where the overload strains came. A brute of a bucket, with a bite that will shake loose any embedded boulder on which its teeth can get a purchase.

★ QUICK-VARIABLE REEVING
for Hi-Power closing ratios up to 7:1.

★ NON-POCKETED BIG SHEAVES
for the saving of abrasive wear on your closing line.

★ THE HEAVIEST JAWS
of any standard digging bucket —and teeth to match.

★ PLUS **a general huskiness and simplicity of design which promises long, trouble-free service.**

GEORGE HAISS MANUFACTURING CO., INC.
140th ST. & RIDER AVE., NEW YORK, 51, N. Y.

Wire, write or phone for catalogs, prices, deliveries.

●

BUCKET AGENCIES THROUGHOUT THE COUNTRY

HAISS

PORTABLE CONVEYORS ★ LOADERS ★ CLAMSHELL BUCKETS

STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE—PARTITION—SCORED Per M. lots of 2,000 pieces or over, 3x12x12 in.	4x12x12 in	8x12x12 in.	STRUCTURAL CLAY TILE—LOAD BEARING—SCORED Per M. lots of 2,000 pieces or over, 8x12x12 in.	10x12x12 in.	12x12x12 in.	BRICK Per M. in quantity Common backing	Straight hard	Per ton, Hydrated finishing	LIME In barrels, Carload lots, Common hydrated	Pulverized, or lump
Atlanta	$104.00	$114.00	$199.00	$234.00	$244.00	$250.00	$13.50	$18.04	$26.54	$15.[illegible]	$15.04
Baltimore	84.00	90.00	170.00	200.00	260.00	320.00	15.00*k*	19.00*k*	18.00	13.00	2.50*m*
Birmingham	80.00	85.00	160.00	191.00	252.00	288.00	14.50	17.00	18.11	13.04	2.25*m*
Boston	89.35*a*	93.30*a*	178.70*a*	202.50	271.80	308.20	16.50*i*	19.50*i*	17.50*t*	12.96*t*	14.92*t*
Chicago	72.00	77.00	145.00	197.00	243.00	278.00	12.50	13.50	17.00	15.00	12.50
Cincinnati	65.55	69.90	131.20	148.70	210.35	240.45	17.50	17.50	15.50	13.00	.....
Cleveland	60.00	64.00	120.00	144.00	193.00	221.00	17.00	17.00	15.75*j*	13.25*j*	3.00*m*
Dallas	62.50	67.50	135.00	162.00	212.50	263.00	13.50*i*	15.00*i*	19.00	15.00	.95*m*
Denver	84.80	95.40	153.70	178.20	212.00	227.90	14.50	17.00	25.00*j*	17.00*j*	20.00*j*
Detroit	86.05	91.80	172.10	213.00	268.00	330.00*s*	17.50	18.00	18.00	16.00	16.00
Kansas City	67.00	69.00	89.00*c*	128.00	163.00	189.00	15.50	16.50	19.32	13.00	10.92
Los Angeles	73.50†*r*	89.50†*r*	128.00*c*†*r*	210.00†*r*	368.00†*r*	460.00†*r*	13.50	15.00	16.50	17.50	17.50
Minneapolis	81.95*b*	87.40*b*	148.70*b*	.....	179.30*b*	249.35*b*	13.60	15.60*g*	21.00	16.00	19.00
Montreal	99.10*a*	105.65*a*	154.75*a*	104.65*au*	154.75*au*	155.25	24.16†*u*	27.25†*u*	24.60*u*	18.00*u*	.....
New Orleans	72.00	72.00	135.00	162.00	210.00	260.00	14.00	.....	18.30	12.08	14.10
New York	78.40	83.60	115.00*c*	193.30*h*	238.80*h*	295.60*h*	15.00*s*	.....	20.00	14.00	17.00
Philadelphia	85.30	91.00	170.50	186.30	235.00	261.10	17.00	20.00	19.00	13.00	15.00
Pittsburgh	62.35	66.55	124.75	140.25	173.25	198.00	17.50	19.50	17.90	15.40	2.55*m*
St. Louis	67.00	95.00	130.00	190.00	244.00	290.00	18.00	17.00	22.00	18.00	2.70*m*
San Francisco	84.00	94.50	225.00	.....	.....	.....	17.50	22.00	20.00	20.00	16.40
Seattle	115.00	125.00	230.00	.....	.....	.....	20.00*f*	21.00*f*	20.00*s*	20.00*s*	20.00*s*

† F.o.b. *a* Smooth. *b* Carload lots delivered to job. *c* 6x12x12 in. *d* Not load bearing *e* 48 lb. tile. *f* Less $1.00, ½ cash 15 days, balance 30 days. *g* Selected common. *h* F.o.b. Perth Amboy, N. J. *i* F.o.b. Warehouse only. *j* LCL. *k* $1.00 discount if paid in 10 days. *l* Lump. *m* Per bbl., 180 lb. *n* Per sack 100 lb. *o* Per bbl., 200 lb. *p* 280 lb. bag. *r* 5% discount 10 days. *s* 2% discount for cash. *t* 5½x8x12. *u* 8% sales tax included. *v* April price.

PAINT, ROOFING—F.O.B. CARLOAD LOTS

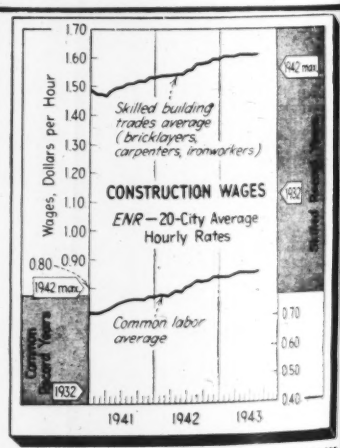
	RED LEAD Per 100 lb. in 600-lb. (Approx.) bbl. Dry *a*	WHITE LEAD Per 100 lb. in oil	READY-MIXED PAINT Per gal., drums Graphite *b*	Aluminum *b*	Ferric Oxide *d*	ROOFING SUPPLIES Carload lots f.o.b. factory Rolls, slate surfaced, 85–90 lb. per sq.	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating, per gal.	Tar pitch, 350 lb. bbl. per ton
Atlanta	$10.25	$14.125	$1.30	$2.25	$1.20	$1.90	$1.61	$1.61	$0.27	$29.00
Baltimore	10.00	13.75	2.00	3.00	2.50	2.30	2.70	2.70	.40	29.00
Birmingham	10.25	14.125	2.35	3.50*r*	1.98*r*	2.04	1.97	1.97	.32	28.35
Boston	10.00	13.75	1.60	....	2.40	2.12‡	1.72*h*‡	1.72*h*‡	.50‡	21.00‡
Chicago	10.00	13.75	....	....	....	1.75*hf*	1.74*hf*	1.82*hf*	.33*f*	23.00*f*
Cincinnati	10.00	13.75	1.70	2.90	1.60	2.40	2.39*h*	2.39*h*	.36	21.00
Cleveland	10.00	13.75	2.10	2.90	1.95	1.93	1.83*h*	1.83*h*	.35	29.00
Dallas	10.00	14.50	1.88	2.11*n*	.05*l*	1.75*h*	1.66*h*	1.66*h*	.35	39.00
Denver	10.50	14.25	1.65	14.25*k*	.27*l*	2.45	3.15	3.15	.35	28.00
Detroit	10.00	13.75	1.75	3.00	1.60	2.10	2.06	2.06	.35	23.00
Kansas City	10.00	13.875	2.39*g*	2.55*gr*	2.16*g*	2.10	2.30	2.30	.28	27.50
Los Angeles	10.25	14.25	1.60	2.25	2.30	2.10	1.50	....	.45	....
Minneapolis	10.00	13.875	....	....	....	1.75*i*	1.66*hi*	1.66*hi*	.32	23.00
Montreal	9.25	6.25	2.50*p*	4.90*p*	3.15*p*	2.67	2.47	2.07	.94	1.85*k*
New York	10.00	13.75	2.03	....*r*	1.64	1.66	1.58*h*	1.58*h*	.26	25.00
Philadelphia	10.00	13.75	1.60/1.80	2.20*r*	1.55	1.75	1.66	1.66	.32	23.00
Pittsburgh	10.00	13.75	1.05	1.95	.80	1.95	1.94*h*	1.94*h*	.34	26.00
St. Louis	10.00	13.75	2.28*s*	2.89*s*	1.96*s*	1.66	1.66	1.66	.29	22.00
San Francisco	10.25	14.00	1.80	2.75*n*	1.35/2.35	1.71	2.40	2.40	.33	19.50
Seattle	10.25	14.25	1.90	3.00	....	2.15	2.16*h*	....	.35	26.50*v*

‡ Delivered. Note: Red lead in oil 50c. higher than white lead in oil. *a* Red lead prices change frequently due to pig lead price charges. *b* U. S. War Dept. Spec. 3-49A. *c* ASTM Spec. D266-31. *d* 80% minimum ferric oxide. *e* Subject to 25% discount. *f* Distributors' price to contractors. *g* 5 gal. can. *h* Per roll, 65 lb. *i* Minneapolis and vicinity. *j* Asphalt pitch. *k* Per 100 lb. *l* Per lb. *m* Per bbl. *n* May, 1941 price, no later quotation available. *p* Plus 8% sales tax. *r* Not available, except on priority rating; then quoted specially. *s* December price.

SKILLED AND COMMON WAGE RATES—PER HOUR

	Bricklayers	Carpenters	Struct. Iron Workers	Hoisting Engineers	Plasterers	Common Labor—Building	Common Labor—Heavy Const.
Atlanta	$1.50	$1.25	$1.50	$1.25	$1.50	$0.40	$0.50
Baltimore	1.75	1.375	1.80	1.625/1.80	1.50	.75	.75
Birmingham	1.75	1.25	1.50	1.25/1.50	1.50	.65	.65
Boston	1.625	1.50	1.65	1.875	1.667	.80/1.00	.80/1.00
Chicago	1.75	1.70	1.76	1.75	1.825	1.10	1.10
Cincinnati	1.75	1.50	1.675	1.45/1.60	1.625	.85	.85
Cleveland	1.875	1.55	1.75	1.75	1.75	1.00/1.25	1.00/1.25
Dallas	1.625	1.25	1.50	1.75	1.625	.60	.75/1.25
Denver	1.65*b*	1.50*b*	1.625*b*	1.43*b*	1.51*b*	.80*b*	.80*b*
Detroit	1.675	1.50	1.75	1.625/1.75	1.675	.90	.90
Kansas City	1.65	1.50	1.625	1.625	1.65	.90	.90
Los Angeles	1.50	1.35	1.625	1.375	1.667	.875	.875
Minneapolis	1.50	1.375	1.50	1.40	1.50*e*	.925	.925
New Orleans	1.50	1.25	1.50	1.50	1.375	.65	.75
New York	2.00*b*	1.85*b*	2.00	2.00*b*	2.00*b*	1.031	.95
Philadelphia	1.90	1.50	1.90	2.00	2.00	.825	.825
Pittsburgh	1.90	1.75	1.75	1.8125	1.875	.90	.80
St. Louis	1.75	1.50	1.75	2.00	1.75	.95	.95
San Francisco	1.875	1.50	1.75	1.50/1.75	1.75	.95	.95
Seattle	1.78	1.48	1.68	2.00	1.78	1.08	1.10
Montreal	92	.81	.90	.76	.90	.46	.53

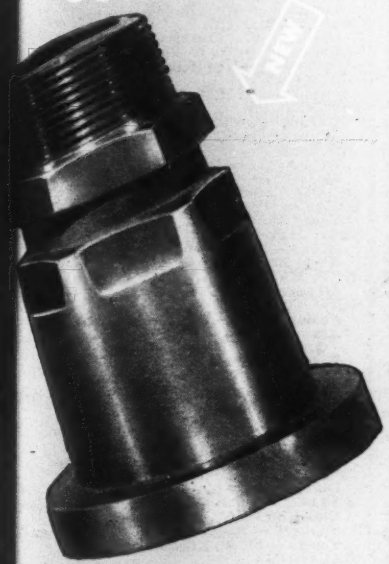
b 7 hr. day *e* 30 hr. wk



ENR Skilled Average; (Bricklayers, Carpenters, Ironworkers) $1.622
ENR Common Average; $0.869

Prevent Valve Failure

before it starts!



ABRASIVE WEAR ruins a Yoke Sleeve — forces a shutdown when lubrication is neglected

Because regular lubrication was neglected, this yoke sleeve from an OS&Y Gate Valve wore out rapidly and failed in service. Important plant operations were stalled when the line was shut down to make the necessary replacement.

As the illustrations indicate, the original sturdy flange on the base of the yoke sleeve (or bushing) was reduced to a wafer-thin "washer" by abrasive wear, and then it sheared off. Since the (yoke sleeve) flange must withstand the entire thrust when the valve is tightly closed, and also when the valve is back seated in the fully open position, it is extremely important that its original strength be maintained by proper lubrication and care.

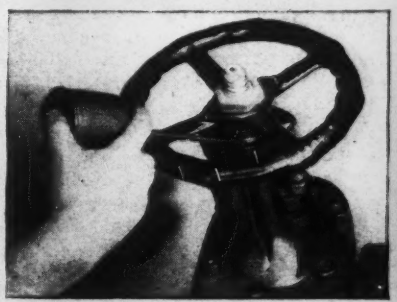
"Hit or miss" lubrication schedules also take their toll of outside spindles, as illustrated. Threads left dry and unprotected are worn by grinding grit on the thread bearing surfaces, threatening sudden failure and injury to operatives, as well as damage to property.

Such production-stalling, metal-wasting valve failure can be prevented – by frequent, systematic inspection – by repair or replacement of worn parts before valves destroy themselves. See that new valves are carefully selected, installed by experts, – and that new men are trained thoroughly in care and maintenance.

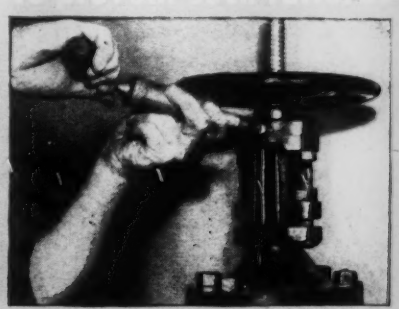
Jenkins engineers will provide assistance in preparing an effective program of valve conservation.

Lubricate Valves on Schedule

— at least Once a Month — to prevent such failure

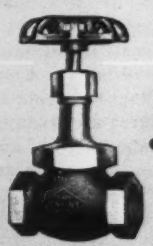


Jenkins Iron and Steel OS&Y Gate Valves have a drilled hole in the yoke cap to supply oil to the moving parts. On the larger size valves, a grease gun fitting is provided in place of the oil hole.



Valves should be lubricated once a month, more often when operated frequently. Outside screw threads should also be cleaned and lubricated, and shielded when dust conditions are severe.

A few cents worth of lubrication — regularly applied — would have saved this spindle



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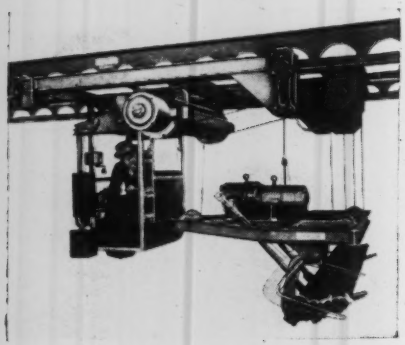
NEW AIDS TO THE CONSTRUCTOR

Welding Shield

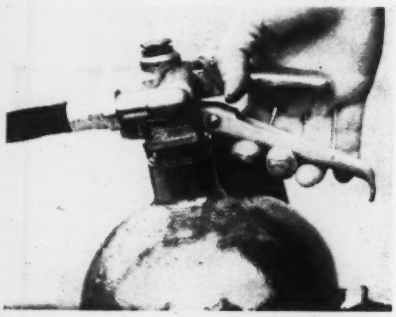
Designed by a welder for extra comfort and complete protection, the new Huntsman acetylene and arc welding shields have patented locking devices and easily adjustable headgear. The locking device holds the shield in correct position to assure that the line of vision passes through the lens at right angles to the glass surface. Held firmly above the head when the worker is preparing or surveying his work, the shield may be lowered into working position by a slight nod, and is automatically fixed by the locking device. These shields, weighing from 1 to 1½ lb., are available in six models. —*Davis Emergency Equipment Corp., 55 Halleck St., Newark, N. J.*



Pipe and Rod Carrier

A new motor-driven pipe and rod carrier, is said to permit the cab operator to pick up 1,500 lb. of stock in 12-ft. lengths from the storage room, transport and set it in racks at fabricating machines, without the aid of any floor men, has been developed.

Since the unit travels overhead its use eliminates the need for extra aisle space and makes possible the saving of considerable floor area. In fact, the unit illustrated is said to have so reduced the need of floor space in an important war plant that 400 metal working machines could be installed and operated efficiently in a space slightly larger than that ordinarily required for 200 machines. This in turn brought about a big saving in building construction materials and in capital investment. This one unit keeps many fast-working machines supplied with stock.—*Cleveland Crane & Engineering Co., Wickliffe, Ohio.*



Fire Extinguisher Valve

A new type of valve for carbon-dioxide fire extinguishers has been developed by the engineers of this company. The new valve operates by a lever directly over the carrying handle of the extinguisher. By merely applying pressure, or squeezing, with one hand, the valve is opened and the gas discharged. On releasing the pressure, the valve closes and the gas discharge is cut off.

The valve can be opened and closed without setting down the extinguisher, as must be done with a handwheel type of valve. As the operator, carrying the extinguisher with one hand and holding the discharge horn in the other, can easily start or stop the discharge while in motion, there is no loss of time or gas while maneuvering around a fire.—*The C-O-Two Fire Equipment Co., Newark, N. J.*

Tandem Power Rheostats

Compact, sturdy tandem power rheostat assemblies of two or more sections are announced by this manufacturer. These assemblies are made up of two 25-watt or two 50-watt rheostats rigidly coupled together and held in a metal cradle. The usual one-hole mounting and locking projection features are retained. The individual rheostats can be of any standard resistance value, taper, tap and hop-off.

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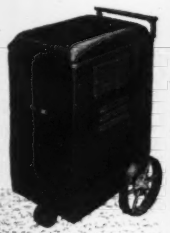

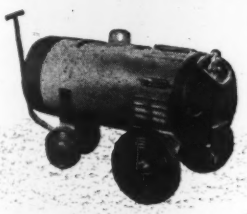

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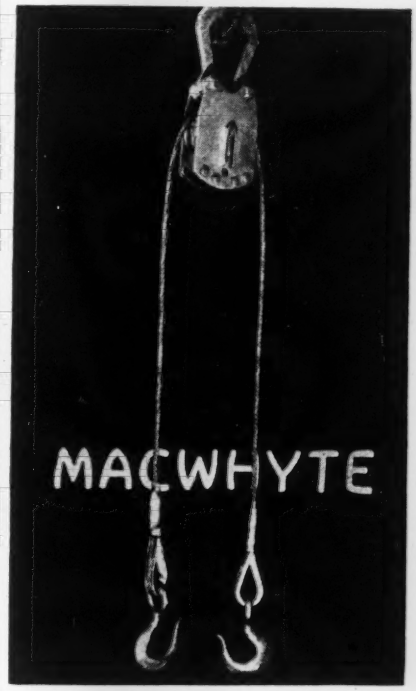
and all units go through the same degree of rotation as the single shaft is turned. The units are fully insulated from each other and from the ground. Because of the wide choice of resistance values and other factors, such assemblies are necessarily made only on special order.—*Clarostat Mfg. Co., Inc., 285–7 N. 6th St., Brooklyn, N. Y.*



New Lift Sling

Thorough trial has been given to a new level-lift, C S E type sling, and the manufacturer finds that a single unit handles 3 tons, a double unit 6 tons, with a safety factor of 5. The sling, by means of a special patented feature, enables the rope to equalize itself and lift unbalanced loads level. It is also said to be easy to use, and to save time and labor in handling long pipes, boxes, steel and flasks.—*Macwhyte Co., Kenosha, Wis.*

Flaring Tool

Said to produce a double-strength flare that will not crack or collapse, on any ferrous or non-ferrous tubing in sizes from $\frac{1}{8}$ in. to $\frac{5}{8}$ in. O.D., a recent flaring tool permits many new applications of soft steel tubing. Fast and precise, this flaring tool is compact, consisting of a pair of holding jaws and a U-shaped clamp, with built-in vise. No special wrench need be used, nor is a workbench required. All wearing parts and punches are of hardened steel.—*Everhot Products Co., 2055 W. Carroll Ave., Chicago 12, Ill.*

Electro-Magnetic Clutch Scale

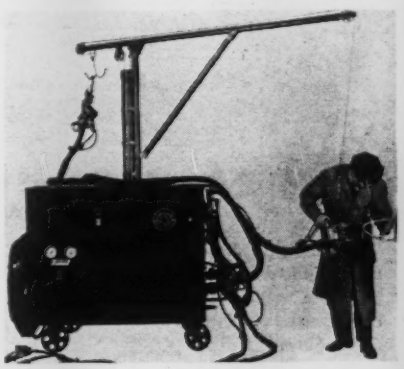
Originally invented to directly indicate rate of flow of fluids, a new electro-magnetic clutch pointer scale is now available. This scale, in addition to the usual weight-indicating pointer, is equipped with a longer secondary pointer, which is brought into operation by an electro-magnet clutch. This clutch is actuated by an interval timer. For other applications it can be controlled by a remote toggle switch or other control instruments. This clutch may be applied to all styles of the company's industrial scales.

The chart, calibrated for 60 times the actual weight indicated, is designed to give by direct reading the pounds per hour based on the one-minute flow interval. It can also carry actual weight, to indicate pounds per minute flow. Charts can be custom-built to apply to any desired time interval.—*The Kron Co., Bridgeport 5, Conn.*

Fly Cutter

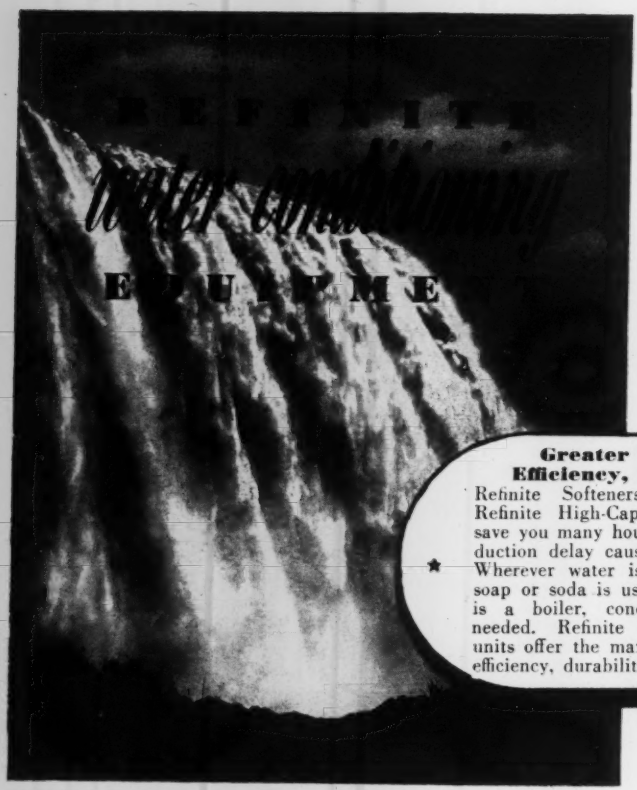
With "problem" materials and hard-to-work substances in mind, a new fly cutter on the market cuts through boiler plate, stainless steel, cast iron and plastics up to 1 in. thick, as well as live rubber. Two important innovations in this cutter, the manufacturer claims, are the generous clearance between work and body, making possible deeper cuts with less tool strain, and a cutting technique that eliminates chatter and assures clean holes. Bits can be easily reground, or replaced.

The cutter is available with straight or tapered shank and expansions of 4 to 10 in. in diam., including decimal or fractional intermediate sizes.—*Robert H. Clark Co., 3424 Sunset Blvd., Los Angeles 26, Calif.*



Field-Repair Cart

An ingenious self-contained field-repair cart for spot-welding of stainless and light-gauge steel parts has recently been developed. It is equipped with an electronic timer and a wide selection of both air operated and manual "tong" type



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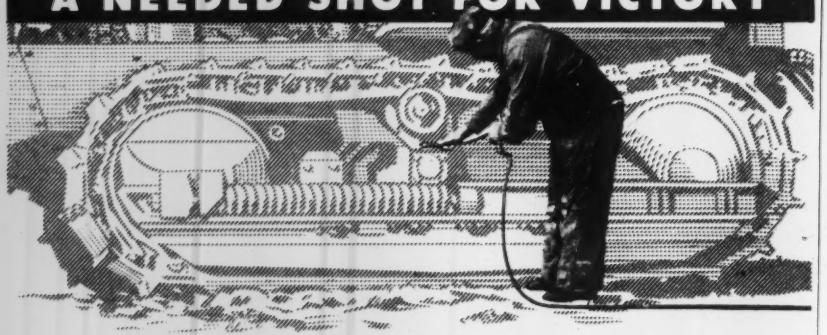

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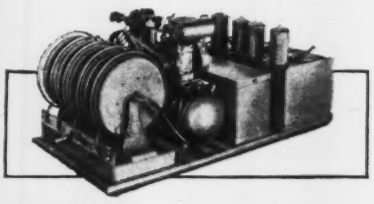

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guns. Since the cart is provided with long cables, the only connection necessary is a power lead.—*Progressive Welder Co., Detroit 12, Mich.*

Direct-Fired Processing Heater

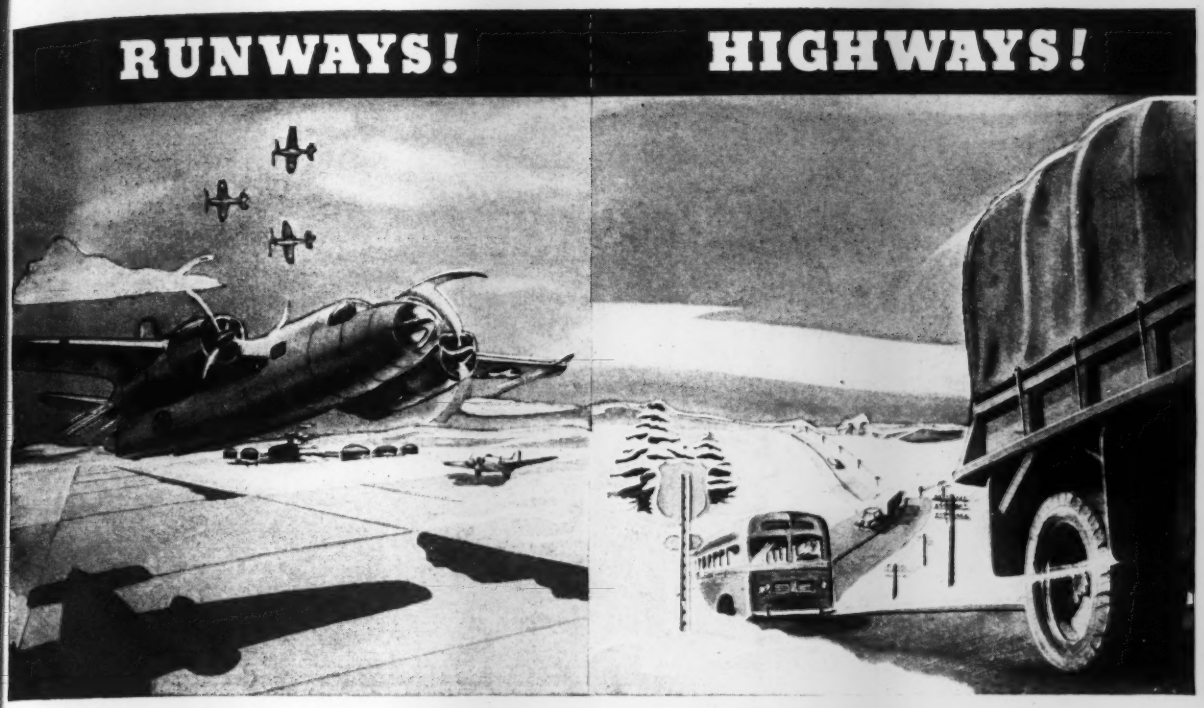
No critical alloy steels are used in coal or oil burning direct-fired heaters for dehydration and chemical processes, said to yield output temperatures between 150 and 350 deg. F, with the heated air free from contamination, by means of a recently developed method. These high temperatures are obtained from heaters with carbon steel combustion chambers, using a recirculating device which allows heated air to be fed back to the heater's intake. Thus the normal temperature rise obtainable by wiping air around the carbon steel fire box will produce any temperature up to 350 deg. F, according to the percentage of air recirculated.

It is claimed that this heating method saves fuel, and is quick and flexible to install. Skilled labor is not required for heater operation. The heaters are available for quick shipment, and for oil, gas or coal fuel. Coal heaters can later be converted to oil or gas.—*Dravo Corp., 300 Penn Ave., Pittsburgh, Pa.*

Chip Breaker Grinder

Great flexibility and high capacity are features of a new carbide tool chip breaker grinder. Replacing a former model, the new grinder is designed to grind chip breakers in single point tools and roller turner tools. It can also be adapted to grind flat form tools.

The long table, with 10¾ in. of travel, makes possible the grinding of breakers in both right and left-hand tools without moving the universal fixture. The head, designed for the use of 6-in. wheels, is vertically adjustable from either side. A base, 29 in. high, with large storage space, is available. Standard motor is



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Another advantage of Vinsol-treated cement in its nationwide applications, is its superior workability. It is more plastic. There is less segregation of the aggregate; less tendency to form mortar pockets. It is easier to spread; faster to finish. As a result crews are able to work closer to the mixer, thus saving time and money.

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You can probably get Vinsol-treated cement with full instructions for its use from your local supplier. We have a 44-page booklet, "Better Roads Ahead." You'll find it practical, instructive, well worth reading. Mail the coupon below for your copy.

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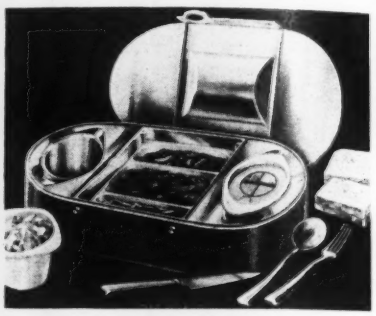
single phase, 110 volt, 60 cycle, ¼ hp. at 3,450 rpm. Shipping weight is 290 lb., with pedestal 390 lb.—*Carboloy Co., Inc., 11177 East 8th Mile Rd., Detroit, Mich.*

Tractor Donkey

Designed for many kinds of construction applications, Model 107L tractor donkey provides a powerful portable unit. The unit has three cable drums—main, haulback and strawdrum—with two operating speeds on each. The main drum spools 960 ft. of 1-in. cable and has an available line pull in low gear of over 30,000 lb.; the other drums are in proportion. This new model replaces the D7N tractor donkey.—*Willamette Hyster Co., Portland, Ore.*



In-Plant Feeding System

Available only to shipyards and essential war plants until after the war, a new food-container system serves war workers hot and cold foods, side by side, up to five hours after filling. Five earthenware food and beverage compartments are used, insulated within pressed steel containers. Each compartment is sealed with snap-in paper covers, and the top lid of the container becomes a comfortable lap tray. A menu of the next day's meal is enclosed for pre-ordering, which simultaneously authorizes charging the worker's account.

Advantages claimed include low-cost, nutritious, vitamin-balanced meals, elimination of staggered feeding schedules and food waste, and reduced absenteeism. —*Mealpack, Inc., 152 West 42nd St., New York, N. Y.*

Stop Nut for Plywood

Tested and approved by the Army Air Forces, a new self-locking fastening device for use on plywood construction has been developed. This stop nut, it is stated, can be installed from one side of the work; it leaves the outside of the plywood surface smooth, provides a washer surface, does not twist in the hole, is replaceable in the event of damage, is independent of the thickness of the wood.

PAN AMERICAN CLIPPERS . . . rush men and materials over the great new air-transport highway between America and the African and Far Eastern battle fronts.

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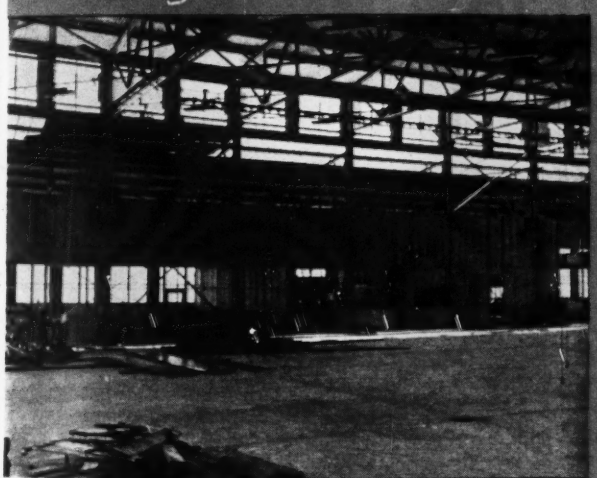
Carey Elastite ASPHALT EXPANSION JOINT

Helps Maintain the Aerial Life Line Flung Across OCEAN, DESERT and JUNGLE by PAN AMERICAN



Located in the African War zone, this building is part of the new Pan American Airways "transcontinental" supply system. Use of Carey "Elastite" Asphalt Expansion Joint assures maintenance of its concrete floor with minimum manpower and expense.

Typical of American courage and ingenuity is Pan American World Airways' record development, in cooperation with the Air Transport Command, of the present air transport route between the factories of our home front and the battle lines of Africa and the Far East. Throughout, the establishment of this veritable aerial life line has been a fight against time, punishing heat, disease, and the problems of native labor. The construction job has been enormous. A chain of air bases had to be quickly strung across the "Dark Continent" where there was scarcely a trail before . . . structures had to be erected for supply and maintenance of the system, and concrete paving was an important part of this construction. Naturally, expansion joints had to be provided. And, on its past record and under scorching tests, large quantities of CAREY Elastite (Extruding) Asphalt Expansion Joint were chosen for that job and protection against the terrific extremes of temperature.

Thus were assured pavements which can be maintained with the very minimum of manpower and expense . . . advantages which CAREY Expansion Joint has so long provided in domestic use.

For your concrete construction—Play Safe—specify CAREY "Elastite" (Extruding) Expansion Joint . . . the joint which maintains itself. For information, write Dept. 38.

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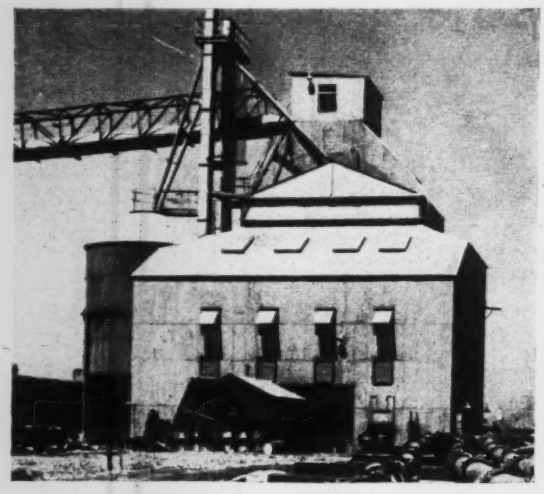

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Whether it's a 400 yard per hour central mixing plant like the one above, or a small bulk cement plant or batch bin, it's design that makes the difference between "just another plant" and an outstanding installation. Be sure your plant is *right* for the job; and remember that if it's a Butler plant, it's an Engineered Design.

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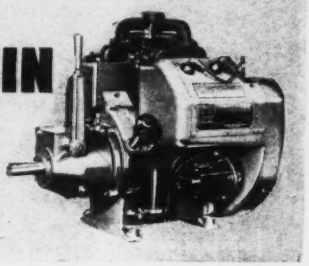
NO GREASE OR OIL FITTINGS

on

WISCONSIN HEAVY-DUTY AIR-COOLED ENGINES



In today's war production set-up, even the saving of fractional manpower for servicing grease cups and oil fittings is important. And neglect of this attention can mean serious damage to irreplaceable production equipment. This can't happen with Wisconsin Engines because there are no grease cups or oil fittings; no lost manpower; no chance for human error or carelessness. Wisconsin Engines are protected by positive force-feed and splash lubrication. You get more "Service" with less "Servicing."

MOST POWER per POUND

WISCONSIN MOTOR Corporation

MILWAUKEE, WISCONSIN, U. S. A.

World's Largest Builders of Heavy-Duty Air-Cooled Engines

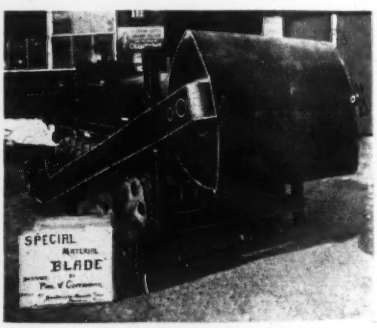
and requires no special tool to affix. The nut-and-basket evolved is self-locking, so that the bolt is secure under severe vibration.

The nut can be installed in three easy ways—driven in with a hammer, forced in with a press, or drawn in with a bolt. It is held against turning by four prongs on the corner of the washer plate, and by feet pressed into the sides of the hole, and can be used on plywood from ¾ in. up. The basket part of the device is extremely light, weighing only 4 oz. per 100.—*Elastic Stop Nut Corp. of America, Vauxhall Rd., Union, N. J.*

Welding Check Charts

To show the three essentials of proper welding—correct electrode, travel speed and welding current—two new welding check charts have been announced. The charts, 18 x 33 in., are printed in two colors on heavy paper.

One chart shows characteristics of weld deposits from electrodes under various incorrect conditions; also a weld showing results when the current and speed of weld are just right. Other illustrations show speed in feet per hour, how to cut rod waste, and how to care for welding equipment. The other chart lists the company's 19 electrodes, and describes the use and purpose of each. The charts are available for 10¢ in stamps, to cover cost of mailing.—*The Hobart Brothers Co., Troy, Ohio.*



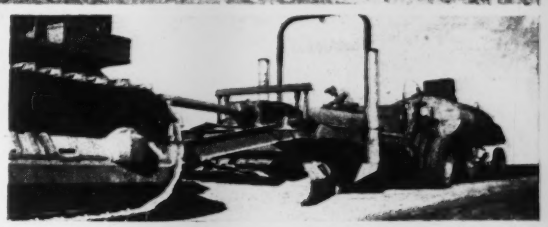
Reversible Blade for Bulldozer

To meet the specific problem of moving bulk materials out of corners to a point under a ship hatch for unloading a reversible blade for a bulldozer was recently developed. The blade is installed on a small tractor (unit shown weighs 6,500 lb.) and lowered into the hold of a bulk material carrier. A single unit is said to do the work of 30 hand shovelers in trimming and clearing the cargo compartments. The blade may be used for either pulling or pushing loads, pulling being the usual operation to get material away from the bulkheads. The blade is balanced so that it may be turned easily by hand and can be locked in either

Compare YOUR PRESENT METHODS OF PAVEMENT CONSTRUCTION WITH THIS SIMPLE *ROAD-MIX* FORMULA

1. *Grade the road or airport to proper elevation.*
2. *Windrow the material into equalized windrows—or determine width of panels to be mixed if windrowing is not necessary.*
3. *Mix the windrowed material with a Wood Roadmixer, using cold asphalt or other binder.*
4. *Spread and compact the mixed material.*

Placing caliche base, with Wood Roadmixers on mid-western airport



In addition to the time-saving simplicity of Road-mix methods of pavement construction consider these additional advantages.

- Road-mix uses native and local materials lying at or near the job. *Material hauling costs are reduced to a minimum.*
- Road-mix uses the mix-in-place or traveling plant method of mixing. *Central plant is eliminated. Labor and equipment are saved.*
- Road-mix is equally satisfactory with emulsions, road oils or soil-cement. *Can be used anywhere paving can be laid.*
- Road-mix equals or excels in quality and long life pavement constructed by any other method and *costs much less.*

These are reasons why an ever-increasing number of paving jobs are being done by Road-mix—reasons why *you* can profitably *design for Road-mix.*

DESIGN FOR ROAD-MIX

Write for detailed and illustrated Wood Roadmixer bulletin, "The Fastest Method of Low-Cost Paving."

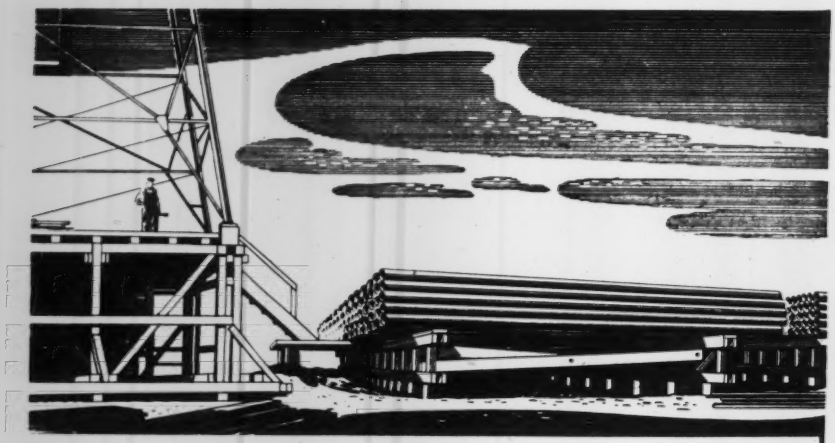
WOOD ROADMIXER

A COMPLETE TRAVELING MIXING PLANT

The original and leading traveling plant method of rapid, low-cost pavement construction. Requires less capital investment, because you buy *only the Wood Roadmixer.* Requires less equipment, because tractor and binder supply truck, standard equipment with every contractor, *are only additional equipment needed.* Requires less manpower, because *two men* can handle the entire unit. Delivers highest production, because actual records of jobs under construction today show production in excess of *250 tons per 8-hour day...* Records prove that Wood Roadmixer will deliver better paving faster and for less money than any other proven mix-in-place method. With proper priority and WPB release we can ship you a Wood Roadmixer today. Write or wire for literature and costs.

WOOD ROADMIXER

Wood Manufacturing Co. • 816 West 5th St., Los Angeles 13, California



This WOOD Finishes One Job, Then Moves On To The Next

DRILLING FOR OIL has its uncertainties, but many oil companies make sure of getting the most for their money on these jobs by building derrick foundations, engine bases and pipe racks of Wolmanized Lumber*. If the well proves in, they are certain of long life for construction that stays on location. If it doesn't, they can tear down and move it to a new site.

WOLMANIZED LUMBER has the high strength required by the heavy loadings placed on these structures. It is easy to handle and erect. And, because it is "alloyed for endurance," there is no depreciation caused by termites and decay. This treated wood is good-as-new when moving day comes.

VACUUM-PRESSURE impregnation with Wolman Salts* preservative gives ordinary wood this ability to withstand decay and termite attack. "Fibre fixation" prevents leaching out of the preservative. Service records covering many millions of feet of Wolmanized Lumber and many years of service are evidence of its lasting ability.

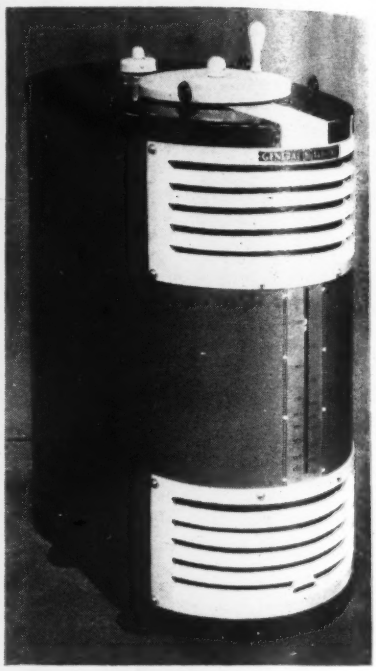
WARTIME STRUCTURES have gone up easier and faster all over the world, thanks to the use of wood. Wolmanized Lumber has assured them of long life and low upkeep. You can profit by this example of the economies that can be obtained by including this long-lived lumber in your postwar planning. American Lumber & Treating Company, 1649 McCormick Building, Chicago, Ill.

*Registered Trade Mark

"Alloyed" FOR ENDURANCE

WOLMANIZED LUMBER

position. The blade can be installed on any make or size of tractor, using a bulldozer or angle-dozer frame. Full information may be obtained from the inventor.—*1st Lieut. P. W. Copenhaver, 3rd Basic S.O.T.R., U. S. Engineers, Fort Belvior, Va.*



Outdoor A-C Welder

Exposure to weather was a factor in the design of a new 500-ampere outdoor alternating-current welder, with a welding current range from 100 to 625 amp. at 40 volts. A desirable feature is an "idlematic" control to reduce output voltage to less than 35 volts when the arc is not in operation, but providing full welding power as soon as the arc is struck. This control includes a switch, with a handle through the top of the case, for manual operation of the welder. The welder is, in addition, provided with all the improved features of indoor welders made by the same manufacturer.

Drip-proof construction and a sealed window over the current indicator protect the welder against rain and snow; wide louvers shed water and keep air velocity low. Internal parts have a special finish to protect against corrosion from moist air.—*General Electric Co., Schenectady, N. Y.*

Lift Trucks

Powerful little industrial trucks aid in "decentralized storage" by maneuvering in narrow aisles to pick up, move or spot material.—*Towmotor Corp., Cleveland, Ohio.*

CHAMPION "IGLOO" BUILDER SAYS . . .

"I agree I had a closed mind when it came to using anything in concrete except *cement*, *aggregate* and *water*. Felt that way for so long it became a habit; regardless of its merits, no other development had much chance with me. The W/C law was my guide.

Then I saw Pozzolith, cement dispersion, at work. For the *first* time I saw W/C ratio cut. "Why and How?", I wanted to know. I investigated and found out. Then I used some Pozzolith - - watched the results both in placing, finishing and completed work, and my costs.

I came to the conclusion that as in most other matters - - few general statements are always true. Exceptions are to be looked for. My present view is, Cement Dispersion is not an "admixture", at least in *my* language."

Find out how Pozzolith will help meet YOUR concrete requirements — write or wire for complete information and demonstration.

THE MASTER BUILDERS COMPANY

CLEVELAND 3, OHIO **TORONTO, ONTARIO**

HOW POZZOLITH
The Cement Dispersing Agent
IMPROVES CONCRETE

"Flocculated" Dispersed

Remember in physics how a group of suspended cork-balls would fly apart when given an electrostatic charge?

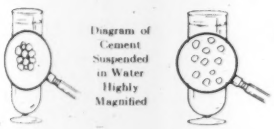


Diagram of Cement Suspended in Water Highly Magnified

Flocculated Dispersed

Similarly, cement particles which bunch together in water, or flocculate, are separated by this same electric force when Pozzolith is added to the mix. Thus greater cement surface area is made available to hydration, resulting in . . .

1. Putting more of the cement to work, by increasing the amount of hydration as much as 40%.
2. Increasing workability, producing up to 2½ times as much slump with the *same* amount of water, or
3. Permitting up to 20% reduction in water, maintaining placeability . . . increasing strength . . . watertightness . . . and durability.

Architect–Engineers Gieb-La Roche and Dahl Chappell teamed up with Brown and Root, Inc., General Contractors, to build 150 ammunition storage "igloos" in 14 days, setting the igloo record up to March 1942. Pozzolith Concrete used throughout.

MASTER BUILDERS

WYTEFACE
"A"
TRADE MARK
STEEL TAPES

K&E
REG. U. S. PAT. OFF.

I'LL TAKE THE WHITE ONE EVERY TIME!

GRADUATED IN INCHES OR TENTHS

EASY-TO-READ, *raised* black graduations on crack-proof white surface . . . resist abrasion from rock, sand, scraping over rails, pipe, concrete, etc. In all sizes and types—in cases or reels. Ask your dealer—or write for catalog.

EST. 1867
KEUFFEL & ESSER CO.
NEW YORK • HOBOKEN, N. J.
CHICAGO · ST. LOUIS · SAN FRANCISCO · LOS ANGELES · DETROIT · MONTREAL

MANUFACTURERS' ACTIVITIES

APPOINTMENT OF J. L. "PETE" MAUTHE as vice-president in charge of operations of the Youngstown Sheet & Tube Co., to succeed the late William B. Gillies, has been announced. The appointment was effective July 1. Mr. Mauthe will have charge of operations of the company's Youngstown and Chicago district manufacturing properties, as well as supervising all its mining properties. Mauthe's promotion came after 31 years in the iron and steel industry, eight of them with the Youngstown Sheet and Tube Co., and a long time with U. S. Steel Corp. subsidiaries in various places.

O. B. SMITH, assistant plant superintendent of the Ideal Co., Waco, Tex., the largest architectural woodwork manufacturing plant in the south, has been promoted to plant superintendent. He takes the place of W. D. Johnston, who died March 28. Other promotions in the executive staff of the Ideal Co. include Everett M. McCracken, Jr., who was advanced from sales assistant to personnel director; and Ronald R. Hay, who was made factory time-study, incentives, methods and cost supervisor in addition to his position of factory inspector.

THE CONTROL of the Nicholson Co., Inc., of 10 Rockefeller Plaza, New York City, has been purchased by Wininger & Selby, Inc., whose officers have been actively engaged in the construction business during their entire business careers. These officers are S. Edward Wininger, president; Paul N. Rylander, vice-president; Cliff Scott, secretary, and Charles A. Selby, treasurer. The company is engaged in the design and construction of concrete bins and tanks for the storage and handling of coal, cement, grain, oil, chemicals and other granular and liquid materials.

TO INCREASE efficient production and supervision methods in manufacturing millwork, 27 supervisors, foremen and assistant foremen of the Ideal Co., Waco, Tex., have just completed a six-month training course on these subjects. The course was prepared by Nathe P. Bagby, who based it on the Ellis Plan Founda-

Now you can insure smooth, hard surfaces!

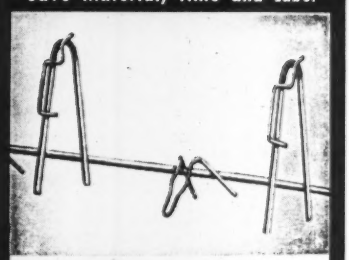
Celotex Absorptive Form Liner Removes Excess Water, Air

See how the section poured against Celotex Absorptive Form Liner is smooth, free of pits and irregularities, as compared with the other section of the same job, poured against ordinary forms! By removing excess water and trapped air, this product insures a smooth, dense, hard outer layer—with better appearance, greater durability, and greater resistance to abrasion.

Successfully used on many government projects, including dams, aqueducts, bridge piers, etc. Write for complete information.

CELOTEX
ROOFING • INSULATING BOARD
ROCK WOOL•GYPSUM WALLBOARD•LATH
PLASTER • ACOUSTICAL PRODUCTS
THE CELOTEX CORPORATION • CHICAGO

Eliminate TIE WIRES
Save Material, Time and Labor



UNION STEEL
Combination Snap-In Slab Spacer and Hi-Chair

● These US 417 units permit "factory production" on the job. They greatly speed up placement of concrete reinforcement. They eliminate all tie wires. Can be used on any reinforced concrete construction . . . especially recommended for bridges, igloos, war plants, etc. . . . comply with Federal Specifications.

SPECIALTIES: Union Steel offers a wide variety of construction specialties. Write for catalog. See Sweet's, Sec. 3-52.

UNION STEEL PRODUCTS CO.
417 Pine st. • Abion, Mich.
SEE OUR CATALOG IN SWEET'S

tion management engineering methods. All phases of handling materials, machines and men for the highest efficiency in manufacturing were covered by the course.

H. W. Smith, assistant manager of engine sales, Caterpillar Tractor Co., Peoria, Ill., recently has been made manager of engine sales. A native of Philadelphia, Mr. Smith first joined the company in 1927. In 1929 he was appointed assistant chief engineer of the plant at San Leandro, Calif., and the following year was transferred to Peoria in a like capacity. For the next two years he was in charge of converting Caterpillar diesel, gasoline and natural gas engines into industrial power units. He became assistant manager of engine sales in 1937.

J. Q. McDonald, now export sales manager, Caterpillar Tractor Co., Peoria, Ill., has also been in charge of the company's general sales manager's office since May, 1942, when G. E. Spain, the then general sales manager was promoted to a vice presidency. A graduate of the University of California, Mr. McDonald has been with the company since 1927. He spent one year in Europe studying the application of Caterpillar track-type tractors in Russia. He also served as district representative in London and in the countries of northern Europe in 1934, returning two years later to Peoria to serve as export sales supervisor.

Worthington Pump and Machinery Corp. has announced that Marcello A. King has joined the organization as executive engineer of its Moore Steam Turbine Div., Wellsville, N. Y., in charge of design, research, testing and service. Mr. King is widely known in the steam power field.

MacGillis & Gibbs Co., timber treating firm with operations at Minnesota Transfer, Minn.; Gladstone, Mich.; in British Columbia, and with headquarters in the Wells Bldg., Milwaukee, Wis., has been taken over by a group of Wisconsin industrialists headed by J. Harold Dumby, Ripon, Wis. Other members of the group include: Clark M. Robertson, Milwaukee; Frank D. MacIntyre, Milwaukee; and H. A. Dumby, president of

WHEN AIR BATTLES HINGE ON *Fast* REFUELING . . .

Fighting planes require fast refueling and service. Every minute counts. Pumping units, powered by small gasoline engines, provide faster servicing of planes. Here again, some of the hundreds of thousands of dependable, instant-starting Briggs & Stratton engines, now serving our armed forces, are on combat duty.

Meeting wartime demands for Briggs & Stratton gasoline engines has proved a BIG JOB. But we like big jobs. In fact, we'd like to see just how big a job we can handle with our facilities for high quality, precision production.

We will welcome the opportunity of discussing your 4-cycle, air-cooled gasoline engine requirements — either for immediate or post-war needs.

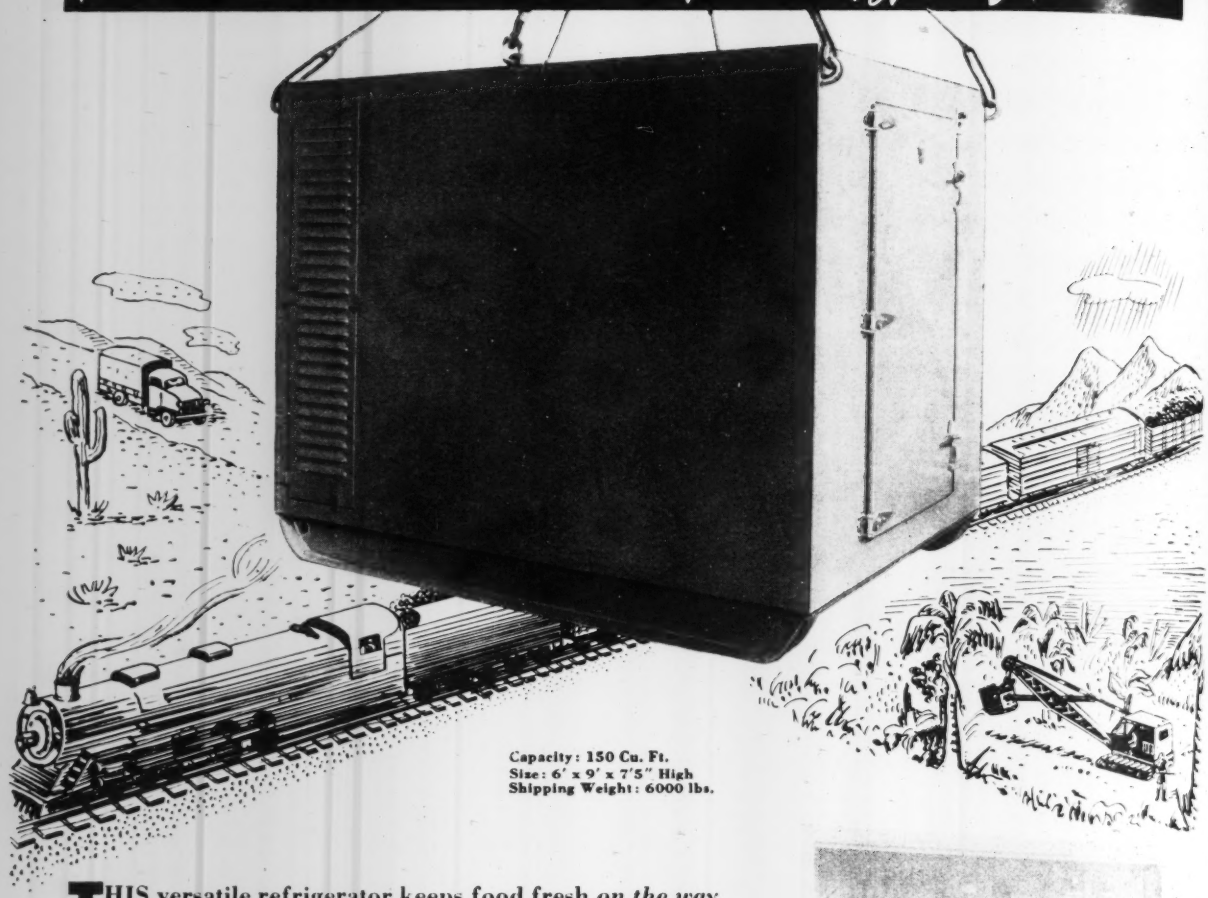
BRIGGS & STRATTON CORP.
MILWAUKEE 1, WISCONSIN, U. S. A.

FOR VICTORY BUY WAR BONDS

4 CYCLE
BRIGGS & STRATTON
GASOLINE ENGINES

WEBER PORTABLE LIFT REFRIGERATION

For all Climatic Condions - For all Types of Power!



Capacity: 150 Cu. Ft.
Size: 6' x 9' x 7'5" High
Shipping Weight: 6000 lbs.

THIS versatile refrigerator keeps food fresh *on the way* and after it arrives *anywhere in the world*... under all climatic conditions... with either gasoline or electric power. No refrigeration expert is required for continuous, trouble-free operation. It will maintain low or standard refrigeration temperatures with a 100° outside temperature differential.

Weber facilities and experience are available for production of any special equipment that is made of metal, wood or glass. Write or wire for details.

3 TYPES OF POWER EQUIPMENT TO MEET WORLD-WIDE NEEDS

1. Type B--Direct gasoline, power operated.
2. Type U--Direct gasoline, convertible to A.C.
3. Type H--Gasoline powered electric, A.C. or D.C.

ARMY NAVY

WEBER FACILITIES & EXPERIENCE "WORKING FOR VICTORY"

WEBER

WEBER SHOWCASE & FIXTURE CO. INC., 5700 AVALON BLVD., LOS ANGELES, CALIF. • EST. 1898

THE FIGHT AGAINST *Mud and Muck* ALSO IS BEING WON!

A NEWS STORY describing the landing of American troops on a Pacific island says, "The soil is a soupy barnyard muck. The soup begins on the beach, goes inland over hills, valleys, ridges and mountains. Through it, supplies, food, ammunition, blankets are taken by 'Caterpillar' Tractors and Trailers."

The hauling of supplies and equipment through the toughest kind of footing is a job for sure-footed Athey Forged-Trak Trailers. Laying their own rails of steel, they serve as a rugged, cross-country railroad, transporting heavy loads through regions where no roads nor trails exist.

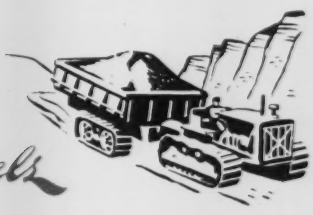
That's why they've been highly successful in the Victory march of the Allied Nations. On every battle front, Athey Forged-Trak Trailers are furnishing the dependable transportation for vital war supplies that mechanized warfare demands. Whether it's in the tangled undergrowth of the tropical jungles or on the tundras of the Arctic, makes no difference to all-weather Athey Trailers. They're "bringing in the goods" to isolated places where other means of transportation would be helpless.

The entire Athey-"Caterpillar" dealer organization has enlisted its forces to keep present machines in good operating condition. If you wish information on the delivery of Athey equipment, or specialized repair service, be sure to see your Athey-"Caterpillar" dealer.

Athey Truss Wheel Co., Chicago, Ill.

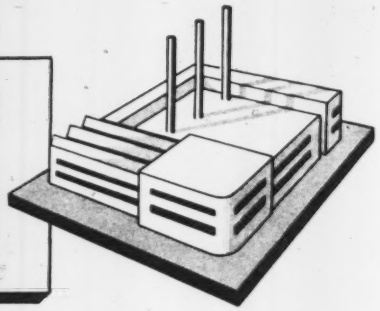
ATHEY

Forged-Trak Wheels



SURE TRANSPORTATION

IT SIMPLIFIES INDUSTRIAL PIPING JOBS



If you need steel pipe for maintenance or new work in your plant, consider this practical answer:

ARMCO can supply straight pipe in carload lots and cut to specified lengths for fabricating on the site—or better still, prefabricate pipe to your exact specifications. Sizes range from 6 to 36 inches; wall thicknesses from 9/64 to ½-inch. You have a wide selection from which to choose the exact size that meets your structural and service needs.

ARMCO Spiral Welded Steel Pipe is amply strong. It has a uniform wall thickness that makes fabrication easier. Welding is no problem because steel is carefully selected for its welding qualities.

We'll be glad to assist with your special industrial piping problems. Write for the informative, illustrated, bulletin—"6" to 36" Pipe for Industrial Uses"—also for quotations and shipping promises. The American Rolling Mill Company, Pipe Sales Division, 2271 Curtis Street, Middletown, Ohio.

Part of a large order of prefabricated and straight ARMCO *pipe awaiting shipment. This is the pipe that makes complicated assemblies go in easily and quickly.*

ARMCO

6" TO 36" STEEL PIPE

the Barlow & Seelig Mfg. [illegible] and Ripon Foods, Inc. of Ripon. J. [illegible] dent of the former comp[illegible] and under whom the firm grew to la[illegible] proportions, becomes chairman of th[illegible] board of the new concern.

W. F. KELLY, plant superintendent at New Castle, has been promoted to assistant manager at that place to succeed Mr. Mullin. He joined the American Manganese Steel Division in 1925 and has advanced through various positions.

The foundries of the American Manganese Steel Division of the American Brake Shoe Co. which will be under Mr. Mullin's supervision, are located at Chicago Heights, Ill., New Castle, Del., Oakland, Calif., Denver, Colo., Los Angeles, Calif., and St. Louis, Mo. The company is now engaged in supplying steel castings to contractors, industrial plants and mines engaged in the war effort. It also manufactures centrifugal pumps, excavating equipment and welding rods.

A. E. BEDELL has been appointed chief engineer of Graver Tank & Mfg. Co., Inc., 4809 Todd Ave., East Chicago, Ind.

GEORGE E. WHITLOCK, president of the newly organized Pressed Metal Institute and president of Mullins Mfg. Corp., of Salem, Ohio, recently had the distinction of being the first civilian to receive the official United States Army Ordnance Department citation for his contribution to the war effort.

JOHN W. DELIND, JR., has been appointed director of exports of the American Brake Shoe Co., coming to American Brake Shoe from General Motors Overseas Operation, where for the past 16 years he has been serving in various executive capacities in connection with the equipment, parts and accessories products of General Motors. During that time his assignments have taken him abroad for 10 years, during which he has been stationed at Osaka, Japan; Singapore, S.S.; Sidney,

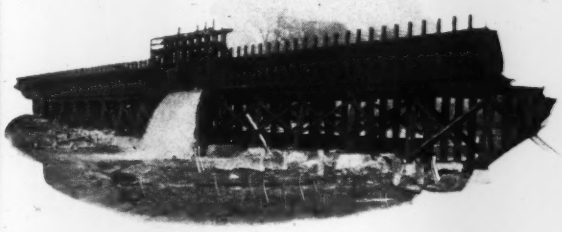
When rivers must walk on stilts...

make them "sure footed"

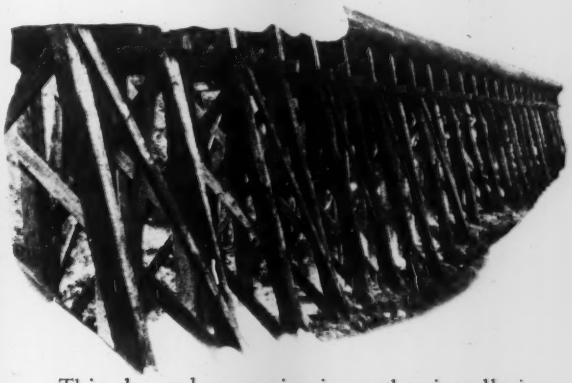
with PRESSURE-CREOSOTED WOOD

When water facilities must be provided quickly and economically for industrial plants, developments, or irrigation projects—this flume may suggest the means of eliminating a lot of difficulties and delays. Here bents, assembled from pre-framed pressure-creosoted lumber, are being erected with simple equipment.

On the river bottom, caps for bents are founded on pressure-creosoted piles. Flume bottom and sides are built of 3″ plank, grooved for splines. Sides are braced with 6″ x 8″ x 12′ uprights, tied in opposing pairs with rods. Stringers are 8″ x 18″ x 32′. All bents are sway-braced and long braced with 3 x 10's.



Completed structure is 1032′ long and 19′ 2″ wide. Sides are 9′ high. Douglas fir, completely pre-framed and treated with 9# Grade 1 creosote, was used. This flume has already exceeded the life of an earlier one by 25%, and is reported by the engineers to be still as "good as new."

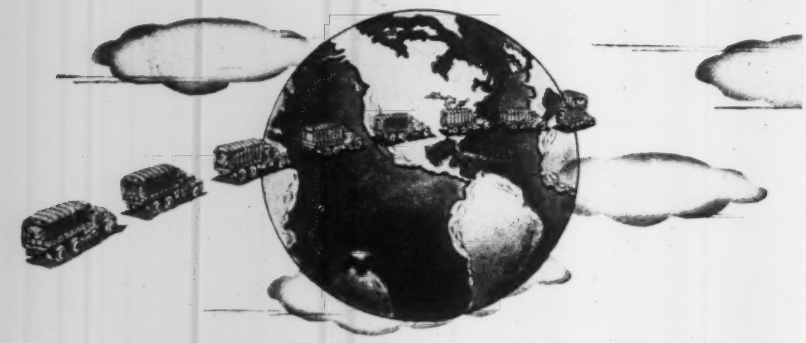


This elevated stave pipe is another installation of particular interest. It is carried on creosoted trestle-work. Pressure-creosoting protects the timber against decay, fungus, and insect attack. Painting for protection is unnecessary. If you have any problem of this nature, ask for details.

KOPPERS COMPANY • WOOD PRESERVING DIVISION • PITTSBURGH, PA.

KOPPERS

THE INDUSTRY THAT SERVES ALL INDUSTRY



GIVING VICTORY A LIFT

ON highways leading to the far-flung battlefields of the world, Cargo Bodies built by the Hercules Steel Products Company are carrying vital materials of war in unbroken lines to our fighting men and their allies.

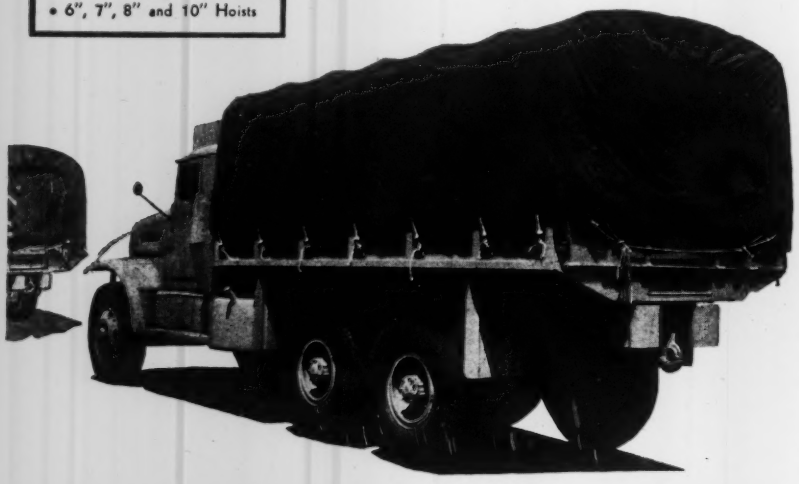
Hercules Dump Cargo Bodies, too, are giving dependable service in many camps and on many fronts, both at home and abroad.

With so large a proportion of our capacity occupied by war production, it's only natural that our distributors' stocks of Hercules Dump Bodies should be low. However, when you need new equipment for any essential project or a war contract, the Hercules distributor can take care of you, and the same Hercules representative will keep your present Hercules Hydraulic Hoists and Bodies operating at greatest efficiency, if you'll call on him when you need service.

REMEMBER THESE FEATURES OF SPEEDRAULIC HERCULES HOISTS

- Exclusive Center-Lift Action
- Double Bridge-type Lift Arms
- Balanced Piston Valve, with Finger Tip Control
- 6", 7", 8" and 10" Hoists

HERCULES STEEL PRODUCTS COMPANY
GALION, OHIO



Australia: Bombay, India, and New York City.

H. B. JAMESON has been appointed division manager of the New England territory of the Aro Equipment Corp. Mr. Jameson is well versed in the application and servicing of pneumatic tool equipment. His headquarters will be 52 Harvard Ave., Allston District, Boston, Mass.

WILLIAM B. GILLIES, vice president in charge of operations of the Youngstown Sheet & Tube Co. and president of the Youngstown, Ohio, Chamber of Commerce, died on June 20. Mr. Gillies began his career in the steel industry immediately after his graduation from college when he became a foreman for Illinois Steel Co. He served in this capacity from 1904 to 1907. From 1907 to 1913 he was superintendent of the Bessemer department at the South Works of the Illinois Steel Co. Through various promotions he became vice president in charge of operations in 1933, which position he occupied at the time of his death.

NEW — JUST OUT!

HOW TO SPEED CONCRETE WORK WITH VIBER VIBRATION

Completely illustrates and describes our new and improved line of Viber Vibrators for gas, electric and air-operation. These are the Vibrators with completely interchangeable parts that are speeding war work everywhere.

• FLEXIBLE PNEUMATIC VIBRATOR

Made in 2⅛" and 3" diameter with 12 ft. and 21 ft. flexible shaft. Complete interchangeability of flexible casings, cores, vibrators. Operates on 80 lbs. pressure.

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Write for Bulletin RD-102

DRILLING CONTRACTORS

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IN the construction era that will follow the present conflict there will be need for great protective covers... covers that will be required to perform unusual tasks. You will profit if you specify yours made from MT. VERNON Extra duck. The great tensile strength of MT. VERNON Extra . . . its high degree of flexibility, its tough resistance to wear and to the elements . . . are all characteristics for which this sturdy duck has long been famed. Specify MT. VERNON Extra.

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ON your next job try this UNIFORM welded fabric. It comes to you in rolls or sheets cut to your *exact* specifications, *uniform* in tensile, *uniform* in maximum strength at welds. You save time, trouble and expense on the job, and get higher performance standards. Don't assume that all welded fabric is approximately the same. Learn why other leading contractors and engineers specify *Clinton*.

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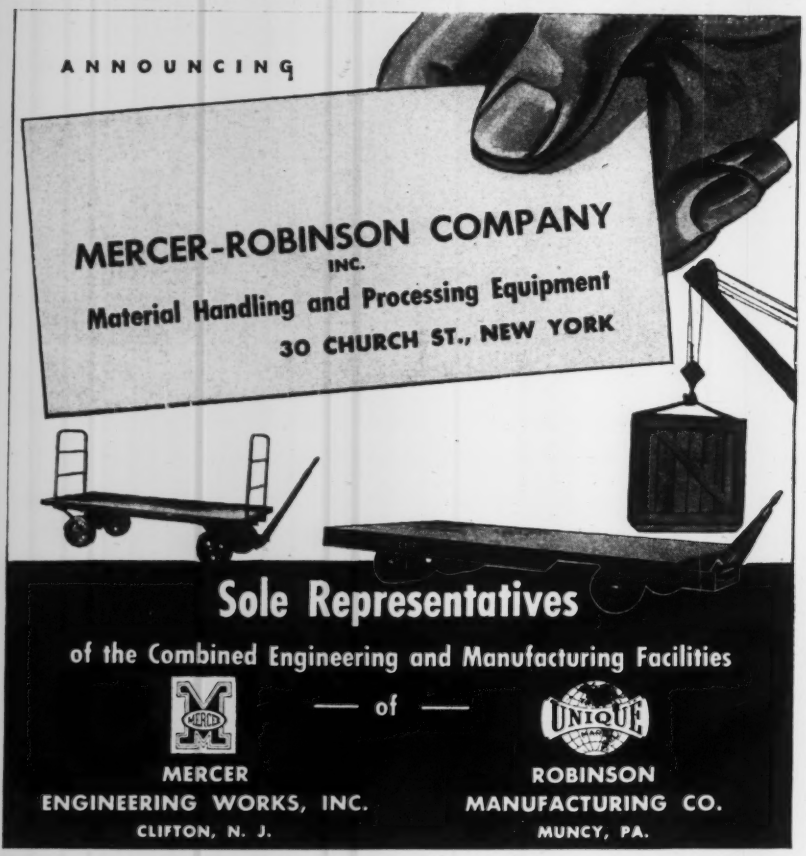

Photocopy Equipment—This folder is of interest to those who want speedily reproduced photocopies of letters, forms, blueprints, drawings, photographs, etc., without investing in heavy or expensive equipment, or in machines that may require special skill.—*The American Photocopy Equipment Co., 2849 N. Clark St., Chicago, Ill.*

Review of Engineering Progress—This year's edition of the Allis-Chalmers' Review contains 212 drawings and photographs of the company's products. The manufacturer says that this book is more important now than it was in peacetime. As makers of highly specialized equipment they are instituting new methods for increasing production that reach into every industry.—*Allis-Chalmers Mfg. Co., Milwaukee, Wis.*

Meter Bulletin—A new bulletin describing water meters has recently been issued. Catalogued therein, with complete specifications, are a half dozen different types of meters. It is stated by the manufacturer that all these meters are built in accordance with the WPB limitation order and that they provide a complete range of sizes and types to handle any measurement need. It is further stated that any of the company's bronze case meters can still be furnished upon proper end use allocation for the Army, Navy, Maritime Commission and lend-lease.—*The Pittsburgh Equitable Meter Co., 406 No. Lexington Ave., Pittsburgh, Pa.*

Crane Trouble Shooter—Arranged in simple question and answer form and indexed for quick reference, a handy pocket-size manual for men in charge of servicing overhead traveling cranes was recently issued. Its purpose is to help industry keep materials handling equipment operating safely and efficiently, and to hold servicing time down to a minimum.—*Crane Division, Harnischfeger Corp., Milwaukee, Wis.*

Arc-Welding Accessories—A complete line of arc-welding accessories is presented in a new 36-page bulletin which comprehensively describes all the standard and new arc-welding accessories now available. Prominently featured are

Remember the Horse Killer?

IF you're old enough to remember silent movies and crystal set radios, you'll probably recognize this gent. He was a pretty familiar sight on our city streets a generation ago. Under his heavy hand, tired, overworked horses collapsed beneath their loads, died on the job before their usefulness had hardly begun.

Today this killer rides again!

On construction jobs all over the country, *good* tires, *sound* tires, tires with thousands of miles of service still in them are literally being beaten to death with loads they were never meant to carry, on jobs they were never designed to tackle, under conditions they were never built to meet.

Do not permit this needless destruction of tires on *your* jobs.

The B. F. Goodrich Company, in an effort to help you cut your costs and save rubber for the nation, is offering to *all* fleet owners a time-proved Tire Conservation Service that for 15 years was available only to operators of large bus fleets.

Under this comprehensive, point-by-point program, factory-trained tire specialists take over the *complete supervision of your tire maintenance*. They apply to your tires the experience they have gained in handling literally thousands of trucks, tractors, and trailers; eliminate the causes of most premature tire failures; and make mileage-stretching recommendations which in many cases result in immediate cash savings to you.

Many of the country's largest fleet operators have already signed up for this low-cost program and write enthusiastically about its benefits. Said one, "We believe we will show a 25% saving." Others report tire failures reduced as much as 60%. One man wrote, "We have had only one tire failure in 149,863 vehicle miles!"

With such results it's no wonder that literally thousands of trucks are operating more successfully and economically under this plan.

For this is no ordinary tire conservation idea, but a scientific program based on putting tire maintenance in the hands of *trained tire men*—the first of its kind to be offered by *any* rubber company. It is another example of B. F. Goodrich leadership in truck tires.

If you would like to know how this program can be applied to the tires on your construction equipment, write the Tire Conservation Department, The B. F. Goodrich Company, Akron, O.

There is an AMERICAN Steel Derrick for every material handling problem. All types—Stiffleg, Guy, Self-Supporting, Traveling or Marine. In sixty years we have learned the answers to derrick work problems and provided for them in AMERICAN Steel Derrick design.

For the duration our facilities are engaged one hundred per cent. in the war effort, but we are still building material handling equipment and the improved facilities which we have installed to speed up war-time production will be available after the war to give our old friends and customers the benefit of improved modern practice and the very latest equipment.

write for catalog D-1

SIXTY YEARS OF SAFETY

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chrome-leather, asbestos and flame-proofed-duck protective clothing for both men and women operators. Among the other items illustrated and described are ventilated helmets and head protectors, observation shields, electrode holders, and various kinds of welding equipment such as slag chippers, electrode carriers, and fillet-weld gages. Also listed are standard sets of welding accessories and renewal parts for them.—*General Electric Co., Schenectady, N. Y.*

Heat Diffuser—A new specification sheet describing blower type heat diffusers, designed to heat and ventilate large areas uniformly and economically, has just been issued. Selective air distribution is assured with two and three fan units and with either plain or louver outlets. The louver outlets have both horizontal and vertical adjustable vanes, permitting on-the-job regulation of the directional discharge of warm air streams without costly sheet metal work, delays or inconvenience.—*Carrier Corp., Syracuse, N. Y.*

Steel Military Huts—A simple, graphically-illustrated booklet covers military huts and utility buildings of steel arch-rib construction. The company supplies a complete building package to meet military requirements for either the tropics or snowbound regions. The company also supervises the production of 30 plants that contribute collateral materials for the steel huts. It has worked closely with

BAILEY METERS AND CONTROLLERS

FOR SEWAGE TREATMENT AND WATER SUPPLY . . .

● Venturi Tubes, Weirs, Flumes, Nozzles and other primary elements; Mechanically and Electrically operated Registers and Complete Automatic Control Systems.

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GATKE Brake Blocks and Frictions — Moulded to machined accuracy in ALL shapes and sizes —

GATKE MAKES
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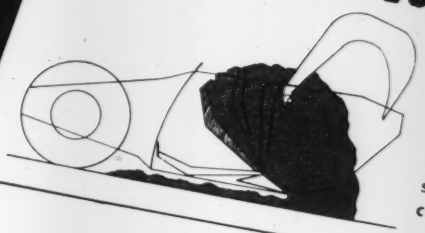
FOR smooth, positive, non-grabbing action for Starting, Swinging, Hoisting and Stopping —you want GATKE High-Heat-Resisting Asbestos Brake Materials.

They are specially engineered and service-proved for all brakes and clutches of Excavating, Road Building and Construction Equipment.

GATKE CORPORATION
236 N. LaSalle St. Chicago

Here's Why HEIL CABLE SCRAPERS Unload Faster and Cleaner with less cable pull

. . . TILTING FLOOR PUSH-OUT



About a third of the load rolls out by gravity, through high-opening front apron. Balance is ejected by moving the tilting floor upward and forward. Hinged tilting floor scrapes sides of bowl clean, hinged section at rear scrapes back sheet clean. Dirt has no chance to stick.

The unloading operation of a Heil Cable Scraper is a honey to watch. Your operator drives onto the fill at hauling speed — without the necessity of shifting gears, because the low line pull required to work the tilting floor does not stall the tractor motor. He spreads *all* the load smoothly and evenly at high speed — with no sticking in the bowl, even in wet, sticky soils . . . Such performance is possible only because Heil engineers have done a thorough job of designing a big-capacity cable scoop for speed, flexibility, and scientific weight distribution—to help you get bigger yardage at lower cost, along with a reputation as a successful operator . . . Use Heil dirt moving equipment, for maximum yardage per hour and maximum productive hours on the job, through easier maintenance, longer life, and simpler field repairs. Write for bulletins describing other Heil design features such as correct bowl design, scientifically located draft-pivot point, fulcrum-type lift, all-welded construction, etc., etc.

TILTING A LOAD REQUIRES LESS EFFORT THAN PUSHING IT

It requires less power to raise and dump a load than to slide it forward against friction. Tilting also gives greatest leverage at the start of the unloading cycle, when the load is heaviest—and a speed-up as the load is dumped, maintaining an even discharge.

View of empty bowl, showing tilting floor in practically vertical position at the end of the unload cycle.

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The HEIL Company is engaged in all-out war production for *Victory*

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Camouflage is confusing—particularly when the 2H mark on a drawing pencil camouflages a 3H lead.... Draftsmen, architects and engineers want a drawing pencil they can *rely* on. That means that the pencil in any given degree *always* has exactly the same feel and produces exactly the same line. It also means that the lead holds the point you give it—and is uniformly smooth, from first sharpening to final stub.

More draftsmen, architects and engineers use the Venus Drawing Pencil than any other make. They can depend on Venus Drawing—whenever and wherever they buy.

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military engineers, not a[illegible] on alternate materials but also [illegible] make the smallest possible package [illegible] save shipping space. Erection of [illegible] hut and arch-rib utility buildings is [illegible] speedy job, requiring only screwdriv[illegible] wrenches and hammers.—*Stran-Steel Division of Great Lakes Steel Corp., [illegible] Penobscot Building, Detroit, Mich.*

Fatigue Strength of Butt Welds—The Welding Research Council Fatigue Testing (Structural) Committee has issued its report on the study of "Fatigue Strength of Butt Welds in Ordinary Bridge Steel." This report is of interest to practicing bridge engineers and others engaged in the construction of steel structures subject to repeated stress. In Report No. 1 the committee told of its study of the effect of periods of rest on the fatigue strength of welded joints, issued in January, 1941; Report No. 2, "Calculation and Graphical Representation of the Fatigue Strength of Structural Joints," was issued February, 1942.—*Welding Research Council, 20 W. 39th St., New York, N. Y.*

Vibrating Equipment—This 176-page book covers electric vibrating equipment used for material handling and processing operations such as feeding, conveying, cooling, drying, packing, screening and many special applications.—*The Jeffrey Mfg. Co., Columbus, Ohio.*

The above item is reprinted from the July 15 issue as, due to a typographical error, another company was given as the manufacturer of this equipment made exclusively by The Jeffrey Mfg. Co.

Contractors' Equipment—A large new catalog has been put out covering crawlers, locomotive cranes, draglines, truck cranes, shovels, overhead cranes, buckets, quarry, sand and gravel equipment, road building and maintenance equipment, railway materials, locomotives, rolling stock, concrete machinery plants, railroad and building supplies and construction equipment.—*Economy Co., Inc., 49 Vanderbilt Ave., New York, N. Y.*

Fabricated Piping—Invasion barges and power plants, tank factories and paper mills, battleships and filling stations—they all require fabricated piping to convey gas, air, steam, oil and chemicals, or for construction purposes. A highly interestingly illustrated book has just been issued on this subject. It covers the various ways in which piping can be used and lists present market prices for every conceivable kind and size of fabricated piping.—*Flori Pipe Co., St. Louis, Mo.*

Concrete Mixer Manual—A new 100-page instruction manual covering operation, maintenance and parts list on con-

SEA-BORNE STORMS

AS WELL AS HIGH TEMPERATURES

. . . with the aid of Bakelite Laboratories

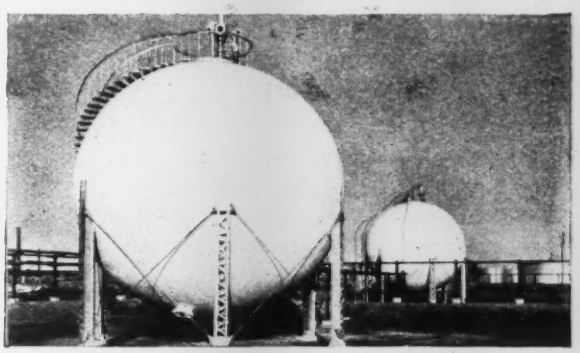
WHEN DESIGNING a field storage system, consider the many conditions to be encountered *outside* your tanks and spheres as carefully as you consider their internal pressures. Even in "ordinary" climates such structures will corrode unless paint specifications have been carefully engineered. And in certain localities, excessive rain, heat, or cold . . . proximity of oceans, lakes, or smoky industrial centers . . . all tend to accelerate the deterioration of metal surfaces. In such instances, especially, maximum outside protection is afforded only when primers and topcoats are planned as *part of the structure.*

In the vicinity of Galveston, for example, abundant rains sweeping in on salt-laden sea winds present a difficult maintenance problem alone. But couple this with temperatures averaging 80 deg. F. for five months out of twelve, and it is easy to understand why most finishes that are satisfactory elsewhere in the country may not offer the same durability on the Gulf of Mexico. Here, however, as in other localities where similar conditions prevail, engineers have found that coatings formulated for outdoor use give longer protection when fortified with BAKELITE Resins.

Through many years' close cooperation with protective coatings manufacturers, and with government and industrial engineers, Bakelite Laboratories have helped to develop a wide variety of finishes that withstand not only long periods of severe weathering, but also abrasion, immersion, and the corrosive action of chemical liquids and fumes. Information on existing surface coating systems based on BAKELITE Resins, or assistance in developing coatings to meet special conditions, can be obtained by writing to Department 8.

BAKELITE CORPORATION, 30 EAST 42ND ST., NEW YORK
Unit of Union Carbide and Carbon Corporation
UCC

TWO YEARS in the extremely corrosive atmosphere bordering Galveston Bay, and the tanks in this field storage system still show no appreciable sign of coating deterioration. All structures are protected with primers and aluminum top coats based on BAKELITE Phenolic Resins.



HIGH TEMPERATURES, averaging 80 deg. F. from May to September, and brilliant sun have not blistered or lifted the BAKELITE Resin Coatings on these steel spheres. Supporting members, steps, and valves are in similar good condition.

SALT AIR AND RAIN, carried in from the Gulf of Mexico, have drenched these storage tanks since early in 1941. Yet no corrosion is apparent on either the steel sections or the welds.

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Cut AIR EXPRESS COSTS
by packing compactly

AIR EXPRESS shipments receive such careful handling that the need for heavy cases and bulky packing is often eliminated. Whether your shipment weighs a pound or a ton, follow these two simple rules to cut AIR EXPRESS costs and to save space vitally needed for war goods:

1. Pack compactly, but securely—to obtain best ratio of size to weight.
2. Break large shipments into smaller units whenever possible.

And for fastest delivery—ship early, as soon as package is ready—as early in the day as possible.

Air Express Speeds War Program

TODAY, AIR EXPRESS not only serves the home front but is also working hand in hand with the Army and Navy to supply our fighting fronts the world over.

TOMORROW, AIR EXPRESS will girdle the globe in international peacetime commerce . . . to bring *all* foreign markets to the doorstep of American business.

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Gets there FIRST

Phone RAILWAY EXPRESS AGENCY, AIR EXPRESS DIVISION
Representing the AIRLINES of the United States

WRITE for our quick-reference handbook on "How to Ship by AIR EXPRESS During Wartime." Dept. PR-3, Railway Express Agency, 230 Park Ave., New York 17, N. Y.

crete mixers, has been published. The book, 6x9 in. in size, contains helpful information for use by operators. It is intended to conserve their mixers and to aid them in getting maximum performance.—*Ransome Machinery Co., Dunellen, N. J.*

Socket Wrenches—New light is placed on the importance of modern socket wrenches by this booklet. Using numerous illustrations to convey its recommendations, the booklet's suggestions are aimed to give information on the extra utility, speed and safety which modern socket wrenches offer. It also gives suggestions for prolonging the life of all small hand tools.—*Blackhawk Mfg. Co., Milwaukee 1, Wis.*

Open Steel Flooring—This is a catalog of open steel flooring and stair treads. It is also an instructive piece of literature of value to anyone responsible for the purchase and maintenance of steel flooring and treads. On one page, for example, is diagrammed the effects of applying the principles of pressure welding to bars of several shapes—round, square, or hexagonal. It contains an accurate and approved table of load capacities, and permissible floor deflections. A table is provided to show the location of holes necessary for the standard installation of treads of various widths.—*Walter Bates Co., Inc., Joliet, Ill.*

Motor Controls—How to select and apply motor control, popularly called the brains of electric drive, is explained in a new 16-page descriptive booklet of General Electric Co. The fundamentals of control are presented in an understandable manner with illustrations and explanatory diagrams for visual aid. Starting with a simple analysis of the functions of control, the pamphlet describes basic control parts of industrial devices. Following this is a discussion of the selection of correct control, explaining how to choose between manual or magnetic, and when reduced-voltage starting is necessary. The balance of the manual is devoted to a progressive breakdown of standard controls available, describing their operation and function.—*General Electric Co., Schenectady, N. Y.*

Excavator Maintenance—A new booklet entitled "Ideas to help you keep your present excavators working and doing more to win the war" is of special interest to owners and operators of shovels, cranes and draglines. This 32-page booklet, attractively illustrated and printed in two colors, is full of practical, experience-tested suggestions on how to maintain maximum excavator production.—*Bucyrus-Erie Co., So. Milwaukee, Wis.*

There's more to conservation than building pipelines

PLEDGED
CONSTRUCTION EQUIPMENT CONSERVATION

Lorain-40A digging a swimming hole for "Big Inch".

WHETHER it's pushing the "Big Inch" across the continent, or hustling to completion any of the other thousands of wartime pressure jobs—construction equipment is taking a terrific beating today.

Jobs are tough, hours are long, delays are inexcusable—and there just isn't any more equipment available to help carry the load. It's plainly a case of "getting more out of what you've got".

That's why conserving construction equipment is one of the "musts" for smart contractors—and one of the reasons you'll find this Conservation emblem on so much equipment. Whenever you see this red, white and blue emblem on a crane, shovel, tractor, bulldozer or truck, you can be sure that the man on the driver's seat is

1. Working hell out of his machine
2. Taking care of it with proper lubrication, adjustments and all the other things that will help it to come back tomorrow for *another big day.*

Want to join the more than 15,000 who already have this emblem on their machines? Just mail a postcard giving your name and address to The Thew Shovel Co., Lorain, Ohio.

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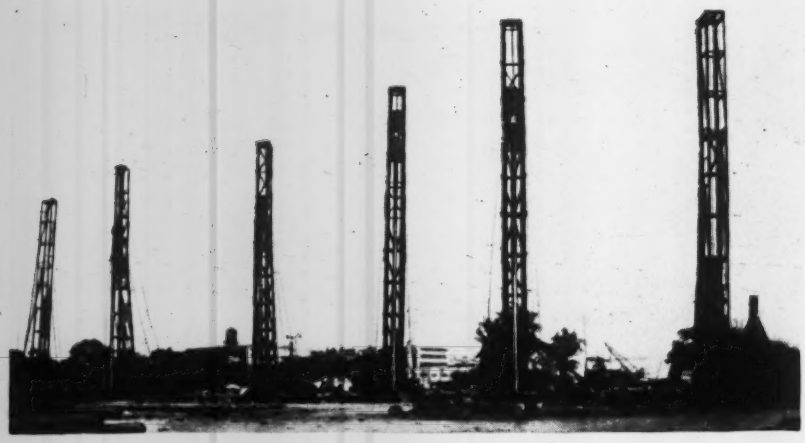
DRAGLINES • MOTO-CRANES



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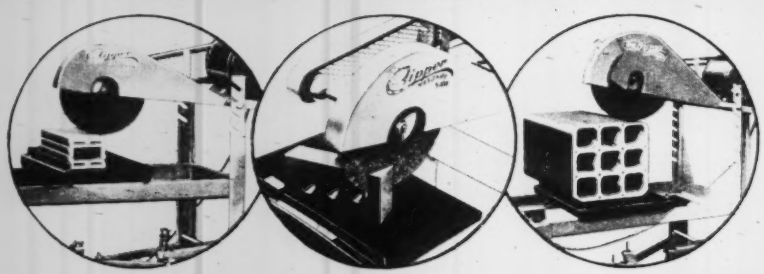
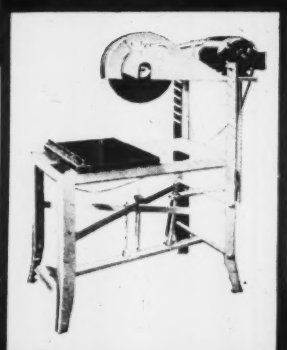
7 MODELS—A DESIGN FOR EVERY JOB!



A Special Shape or Shorter Length Need Only Be As Far Away As Your Clipper



Clipper Masonry Saws have become a familiar sight on construction work all over the country, because they really do a job

The basic feature of Clipper's is the new multiple cutting principle . . . a method developed especially for Masonry Materials. You can be sure to cut with the fastest possible cutting speed and to obtain the longest blade life.

CLIPPER MFG. COMPANY
1002 S. Van Deventer • St. Louis, Mo.

New Engineering Books

(*Continued from p. 112*)

UNIFORM BUILDING CODE—1943 Edition—322 pp. Pacific Coast Building Officials Conference, Los Angeles. $2.

THE ART OF CAMOUFLAGE—By Lt. Col. C. H. R. Chesney, 252 pp. The Studio Publications, Inc., New York. $2.75.

ENGINEERING INDEX—58th Edition. Over 25,000 annotations of articles in current engineering literature. Engineering Index, Inc., 33 West 39th St., New York. $50.

MODERN BUILDING INSPECTION—By Clyde N. Dirlam, Harold P. Huls and others. 376 pp. R. C. Colling and Associates, Los Angeles. $5.

FORMULAS FOR STRESS AND STRAIN—By Raymond J. Roark. 359 pp. McGraw-Hill Book Co., New York and London. $4.

HE'S IN THE ENGINEERS NOW—By Carl Mann. 224 pp. Robert M. McBride & Co., New York. $2.50.

ENGINEERING PROBLEMS ILLUSTRATING MATHEMATICS—By John W. Cell. 172 pp. McGraw-Hill Book Co., Inc., New York and London. $1.75.

FUNDAMENTALS OF ENGINEERING DRAWING—By Warren J. Luzadder. 536 pp. Prentice-Hall, Inc., New York. $4.

BASIC PROBLEMS IN ENGINEERING DRAWING—By William Wirt Turner. Forty loose-leaf sheets. The Ronald Press Company, New York. $1.25.

ENGINEERING DRAWING PROBLEMS—A supplement to Engineering Drawing ($3). By Isaac Newton Carter and H. Loren Thompson. 160 plates. International Textbook Co., Scranton. $2.25.

Reports and Pamphlets

FINANCIAL STATISTICS OF COUNTIES: 1941—Final Report, May 1943. U. S. Department of Commerce, Washington, D. C.

CAMBRIDGE, MASS.—Annual Report of the Board of Health for year ending Dec. 31, 1941.

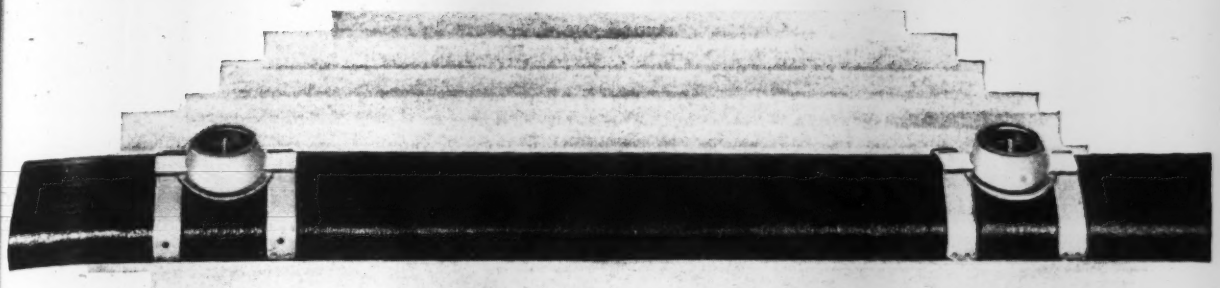
CUADROS SOBRE INVERSIONES, Trabajos Efectuados y Costos en la Construccion y Conservacion de Carreteras, en el Ano 1941. Ministerio de Fomento, Direccion de Caminos y Ferrocarriles, Lima, Peru.

HAWAII—Report to the Governor By the Superintendent of Public Works for the Year ending June 30, 1942.

CONCORD, N. H.—Seventh Annual Report of the Board of Water Commissioners, 1941.

QUEBEC—Twenty-seventh Report of the Quebec Streams Commission, 1938 and The twenty-eighth report, 1939. Quebec, Que., Canada.

ILLINOIS—State Water Survey, Bulletin No. 35. Ground Water Supplies of the

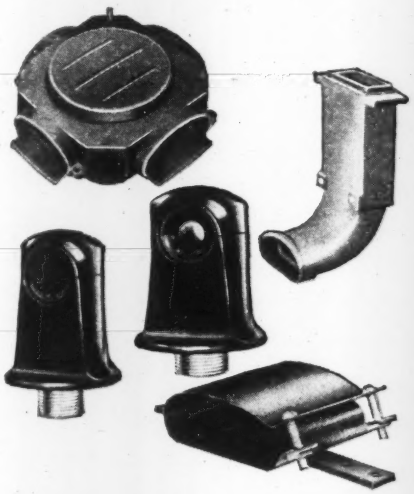


G-E FIBERDUCT FOR UNDERFLOOR POWER DISTRIBUTION

Here is an underfloor raceway that will make power available for wartime needs. Use G-E Fiberduct in factories, machine shops, aircraft hangars and office buildings. You'll like the flexibility it gives. Inserts for outlets can be preset at the factory, or set when the Fiberduct is installed, or set at any later time.

G-E Fiberduct is made of non-corrodible, impregnated fiber and is moisture resistant and high in mechanical strength. Ducts can be used to carry power lines, lighting circuits, telephone lines or signal systems. The interior of the duct is smooth so that wire pulling is easy.

G-E FIBERDUCT BOXES, FITTINGS AND OUTLETS



A full line of boxes and fittings are available for easy installation of G-E Fiberduct including single-, double- and triple-duct boxes, couplings, supports, elbows, etc. Outlets include cable risers and plastic-covered telephone and convenience outlets.

FOR FURTHER INFORMATION about G-E Fiberduct underfloor raceways and G-E Fiberduct boxes, fittings and outlets, see the nearest G-E Merchandise Distributor or mail the coupon for a catalog.

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TODAY—despite material shortages—new "cities" must spring up as if by magic.

And Henry J. Kaiser's architects find ways to meet the situation—in record time. So here's another "first" in building big dormitories—*the use of plasterboard and glue for exterior wall construction.* The job: housing 11,000 workers of the Swan Island, Vancouver and Oregon shipbuilding yards.

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General contractors were Reimers & Jolivette, architects were Wolff & Phillips, and Frank Stepanek was the plasterboard contractor.

Construction glues—and modern methods—are Laucks specialty. Write or wire today for information about the *right* glue for your job.

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● Don't forget, LAUX REZ, the pioneer resin sealer and primer, protects wood as rust-proofing protects metal.

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THE PERCENTAGE STRESS-[illegible] DIAGRAM AS AN INDEX TO THE CONSERVATIVE BEHAVIOR OF MATERIALS UNDER LOAD. By H. J. Gikley and Glenn [illegible]. Iowa State College Bulletin No. [illegible].

THE ALABAMA STATE HIGHWAY MAINTENANCE PROBLEM, 1942-1946. Prepared by Alabama State Planning Commission, Montgomery.

SOUNDNESS OF AGGREGATES. Circular 32, American Society for Testing Materials. Reprint by the National Sand and Gravel Assn., Munsly Bldg., Washington, D. C.

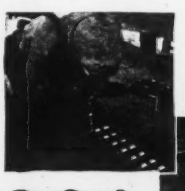
FLEXIBLE PAVEMENT REACTION UNDER FIELD LOAD BEARING TESTS.—By Prescott Hubbard. Research Series No. 9. The Asphalt Institute, New York.

APPLICATIONS OF STRUCTURAL STEELS AND LIGHT-WEIGHT ALLOYS for Bridges, Buildings and Similar Structures. By F. H. Frankland. American Institute of Steel Construction, New York.

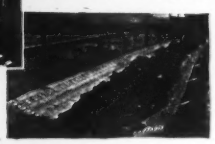
TESTS OF COMPOSITE TIMBER AND CONCRETE BEAMS—By Frank E. Richart and Clarence B. Williams, Jr. Bulletin No. 343, Engineering Experiment Station, Urbana, Ill.

LOSS OF HEAD IN FLOW OF FLUIDS THROUGH VARIOUS TYPES OF ONE-AND-ONE-HALF-INCH VALVES.—By Wallace M. Lansford.

DISTRIBUTION OF HEALTH SERVICES IN THE STRUCTURE OF STATE GOVERNMENT. Public Health Bulletin No. 184. U. S. Public Health Service, Washington, D. C.



KEEP YOUR CONVEYOR BELTS GOING



FLEXCO H D RIP PLATES are used in repairing rips and patching conveyor belts. Their use saves expensive replacements and extended shutdowns.

● Avoid shutdowns and lengthen the life of your conveyor belts and bucket elevator belts by using Flexco belt fasteners. Thousands of companies have stepped up the performance of conveyor lines and cut costs by using Flexco methods.

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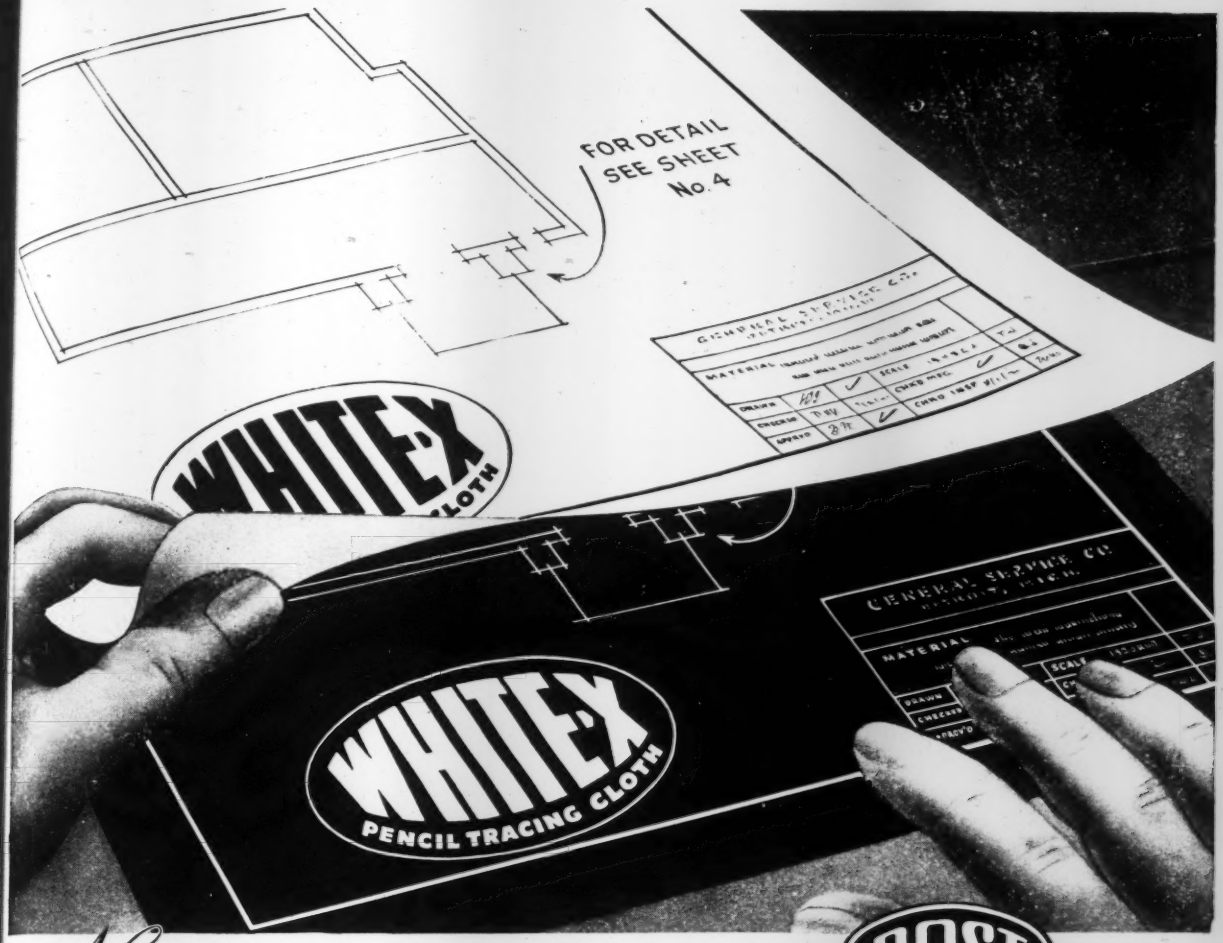

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36-inch valve with welding end, carbon-moly body and four to six per cent chrome-moly vane. Equipped with alloy shafts and bushings, finned lubricated stuffing box and hydraulic cylinder with positioner. The auxiliary heavy duty hand wheel control is equipped with self-locking worm and gear and declutching unit.

Standard 125 lb hand lever operated valve. Can be equipped with hand wheel, chain lever or chain wheel. An extension shaft is provided for inaccessible locations.

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15 to 900 psi
for air, gas, steam, liquids and semi-solids

A glance at the design of an R-S Butterfly Valve indicates that there is practically no restriction to the flow. The carefully-machined body bore and streamlined vane offer minimum resistance. In fact, the flow conditions are similar to those produced in a venturi tube with high pressure recovery on the downstream side.

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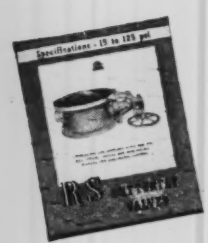

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NOTES ON RESERVOIR SILT[illegible] AND SUSPENDED-LOAD MEASUREMENT[illegible] IN IDAHO—By L. C. Gottschalk, [illegible] Dept. of Agriculture, Soil Conser[illegible] Service, Washington, D. C.

A REVIEW OF THE EVIDENCE CONCERNING EXPANSIVE REACTION BETWEEN AGGREGATE AND CEMENT IN CONCRETE—Bulletin No. 161, Council for Scientific and Industrial Research, Melbourne, Australia.

PUBLIC LAND ACQUISITION FOR HIGHWAY PURPOSES—Public Roads Administration, Washington, D. C.

THE CLINICAL RECOGNITION AND TREATMENT OF SHOCK—Medical Division, U. S. Office of Civilian Defense, Washington, D. C.

WAGE RATES AND LIVING COSTS IN A WAR ECONOMY—By Maurice S. Brody, School of Business, University of Chicago, 5750 Ellis Ave., Chicago. $1.

THE FORMATION, DISTRIBUTION AND ENGINEERING CHARACTERISTICS OF SOILS—State Highway Commission of Indiana and The Engineering Experiment Station, Purdue University, Lafayette, Ind.

INTERNATIONAL ASSOCIATION FOR BRIDGE AND STRUCTURAL ENGINEERING—Tables of Contents and List of Authors of Vol. 1 to 6. Published by the General Secretariat in Zurich, Switzerland.

POST WAR ENGINEERING—No. 3, Iowa Engineering Society Proceedings and Exponent. 418 Hubbell Bldg., Des Moines, Iowa.

THE EFFECT OF CONSTRUCTION ON OUR NATIONAL ECONOMY—An address by Chas. M. Upham before The Conference Board, New York, May 26, 1943. American Road Builders Association, Munsey Bldg., Washington, D. C.

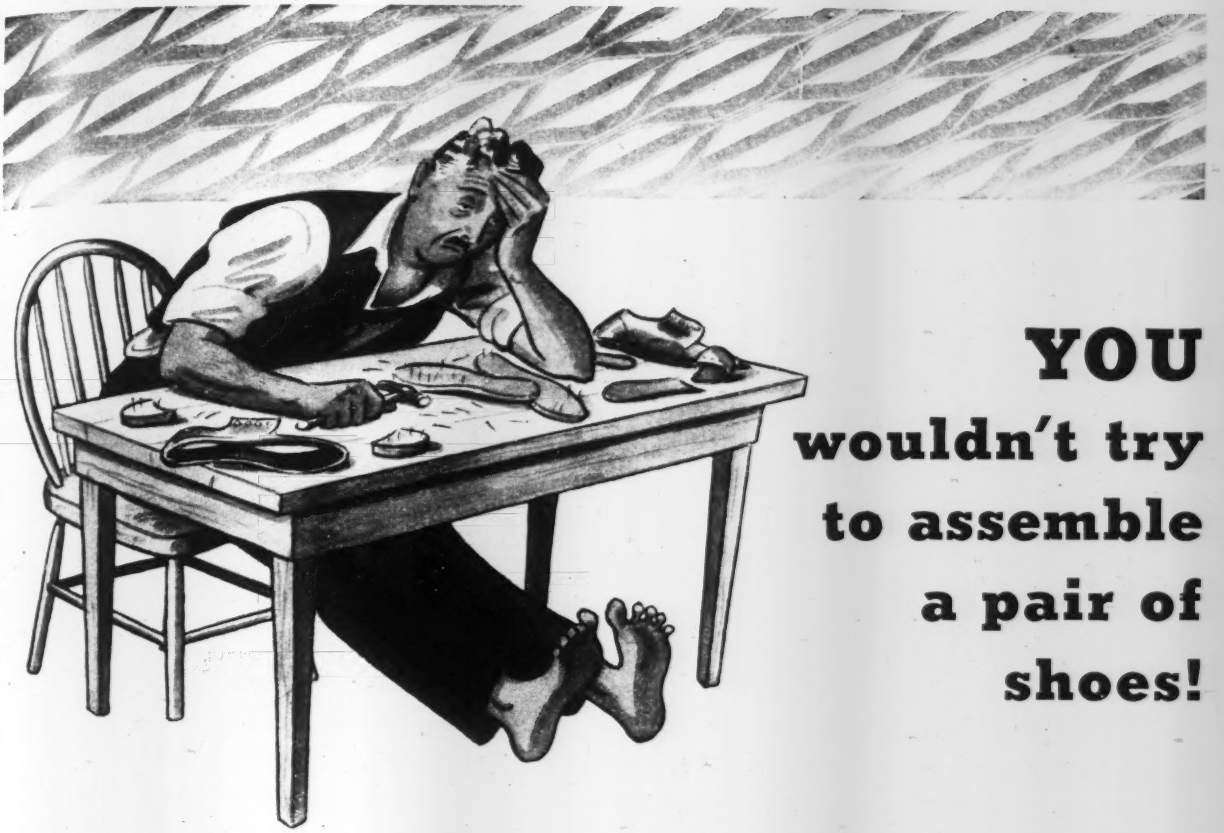
MEN AND JOBS

Col. Francis H. Kuhn, who is well known in army construction circles, is now stationed at Camp Butner, N. C., as director of the Supply and Service Division of the Post Commander's Staff. Kuhn reported to Camp Butner from Hawaii where he served for three years as purchasing and contracting officer, chief of Reclamation Division and post quartermaster. Prior to going to Hawaii, he served as construction engineer at Randolph Field, Texas.

Fred Buck, of Helena, Mont., has been appointed to a second term as Montana state engineer. He will serve until March 1947. He also holds the position of chief engineer of the state water conservation board.

Lt. Col. John H. Peil is now district engineer at Rock Island, Ill. He has been employed in the Rock Island district for many years in a civilian capacity.

Lt. Col. Edward M. Markham, Jr., formerly connected with the 78th division at Camp Butner, N. C., has been transferred to an engineer regiment in Kansas.



YOU wouldn't try to assemble a pair of shoes!

—of course *you* wouldn't. By the time you were through they not only would cost you *plenty*—but they'd probably generate a fine bunion crop.

And—we hope—you won't attempt anything as ridiculous when you install Open Steel Floors. GENUINE Open Steel *GRATING* Floors are usually made to *your* plans, cut and banded to be quickly installed on your job, reducing expensive field welding and reinforcing and making a pronounced saving in installation manpower.

When comparing Open Steel *GRATING* Floors with any other type of floor, compare the job *completely installed,* ready for use. The figures will probably startle you. Many steel fabricators after installing other types of floors have come back to Open Steel *GRATING*, recognizing *it* as a properly engineered floor.

To eliminate slipping and tripping hazards—to get the best steel floor at the lowest—installed—cost—specify and use Open Steel Floor *GRATING* made by members of this Institute. This is no time to take chances with deflections greater than pre-war standards.

Write today for a guide to specifications and standard practices to the Open Steel Flooring Institute, First National Bank Bldg., Pittsburgh, Penna.

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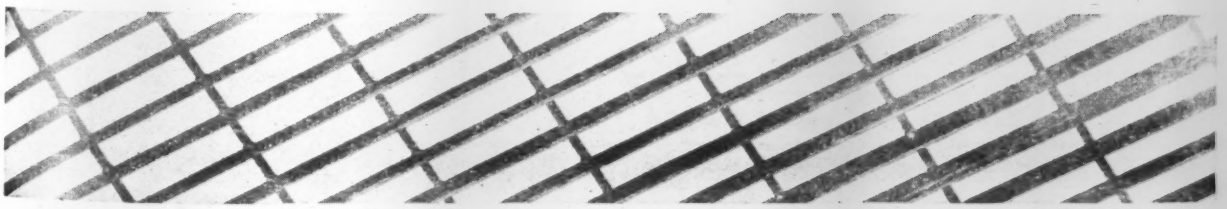

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FOR BUYING MUELLER TAPPING VALVES, CROSSES, AND SLEEVES

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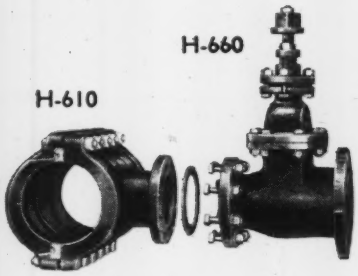
H-610



1. Tapping valves same design as MUELLER - COLUMBIAN A.W.W.A. Gate Valves. Practically all parts are interchangeable. Cuts stock of parts needed.

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4. Special ball-joint packing mechanism prevents binding of stem. Can be repacked in open or closed position. No leaks.

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7. Scientifically placed ribs on sleeves and crosses actually strengthen the main. Eliminates strain on joint. Prolongs life.

8. Tested to twice the working pressure for which they are made. They must make good. No breakdowns.

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10. Branch or lateral connections can be made under pressure. No need to shut off water. Saves time.

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Battalion since last summer. He was graduated from West Point in 1928 and, following a tour of duty with the signal corps, attended Cornell University where he received his civil engineering degree. He then became company commander of the 5th Engineers at Camp Lee, Va., and later was transferred to Schofield barracks, Hawaii. He later was in charge of rivers and harbor work, relinquishing this position before attending division officers school at Fort Leavenworth, Kan.

M. P. O'Brien, professor of mechanical engineering and for two years director of engineering, Sicence and Management War Training courses, University of California, has been appointed dean of the College of Engineering.

Jesse H. Heidtmann has become associated with Brown & Matthews, Inc., engineers and constructors, 122 East 42nd St., New York, N. Y., as vice-president.

Lewis W. McIntyre, executive vice-president of the Pittsburgh Motor Club, and Pittsburgh civil engineer who in the 1920's designed Pittsburgh's downtown traffic signal system said to be the largest flexible progressive traffic signal system in the world—has been commissioned a major in the C. S. Army and will train at Fort Custer, Mich.

David MacGregor has been appointed chief engineer of the Edward Valve and Mfg. Co., Inc., East Chicago, Ind., with which company he has been associated in various engineering capacities since 1925. He was educated in Scotland and took additional engineering training at the Illinois Institute of Technology and Purdue University.

Professor Douglas S. Ellis, head of the Department of Civil Engineering at Queen's University, Kingston, Ont., has been appointed Dean of the Faculty of Applied Science and Engineering.

Robert L. Groover, principal assistant engineer, Atlantic Coast Line Railway, at Wilmington, N. C., has been appointed Associate Director of the Division of Railway Transport of the Office of Defense Transportation, Washington, D. C.

Ralph A. Smith, chief engineer of the Holyoke, Mass., Water Power Co. since 1926, has been appointed superintendent of production for the Rockland, N. Y., Light & Power Co. Mr. Smith entered the service of the Holyoke Water Power Co. in 1920 and has since been in charge of all engineering and construction work, system planning, rate and contract activities, and has been responsible for com-

"WITH Gulf Products our trucks deliver dependable service 12 hours a day,"

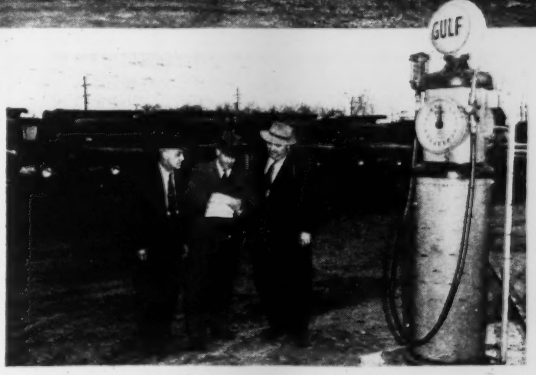
says hauling contractor for war projects

"Proper Lubrication and efficient fuel performance keep our equipment continuously on the move at low cost"

Today the care and maintenance of large truck fleets, such as the one operated by William A. Harting of Lansdowne, Maryland, is no easy task. It demands exacting attention to every detail—one of the most important of which is the use of proper lubricants and fuels.

Construction men have found through experience that the use of high quality petroleum products is the surest guarantee of efficient operation and the best insurance against breakdowns or mechanical failures. That is why so many contractors engaged in vital war construction work today are turning to Gulf Quality Products.

In addition to their high quality, there are three additional advantages in using Gulf products: first, an experienced Gulf engineer recommends, on the job, the proper types and grades for each requirement; second, you're sure of getting lubricants exactly suited to your equipment and to your operating conditions



William A. Harting, contractor of Lansdowne, Maryland, is engaged in hauling under sub-contract for many firms doing war-construction work in Maryland. He has just completed hauling for a large airport, and is now building defense highways leading to several Naval and Air bases. His fleet consists of 65 trucks of 3½- to 5-ton capacity with an average load of 4 cubic yards. He is shown above conferring with a Gulf Service Engineer.

—for the Gulf line includes over 400 quality oils and greases; third, Gulf's wide distribution through more than 1200 warehouses, located throughout 30 states from Maine to New Mexico, insures prompt delivery.

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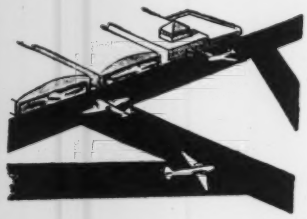

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For many years **W. E. ...** of Sheff... N. B., has been polic... chief and to... engineer. Recently he r...igned as pol... chief but will continue ... the engine... The town engineering ...ties now t... all his time because of ... wartime lo... in his community.

W. O. Silverthorn, editor of the P... land, Ore., Daily Journal of Commer... for more than 10 years, will head th... army engineers department of publi... relations in the Portland district, ha... dling press releases to the construct... industry.

Lt. Sam J. Mathis, USNR, who was as... sistant maintenance engineer with th... South Carolina highway department be... fore entering the navy, was recently awarded the Legion of Merit by Lt. Gen. Millard F. Harmon, commanding general of the United States army forces in the South Pacific area. Lieutenant Mathis served for some time with the Seabee branch of the Navy and the Civil Engineer Corps. He received his citation for meritorious conduct in his performance of services as naval construction officer in charge of building four airfields in the South Pacific area.

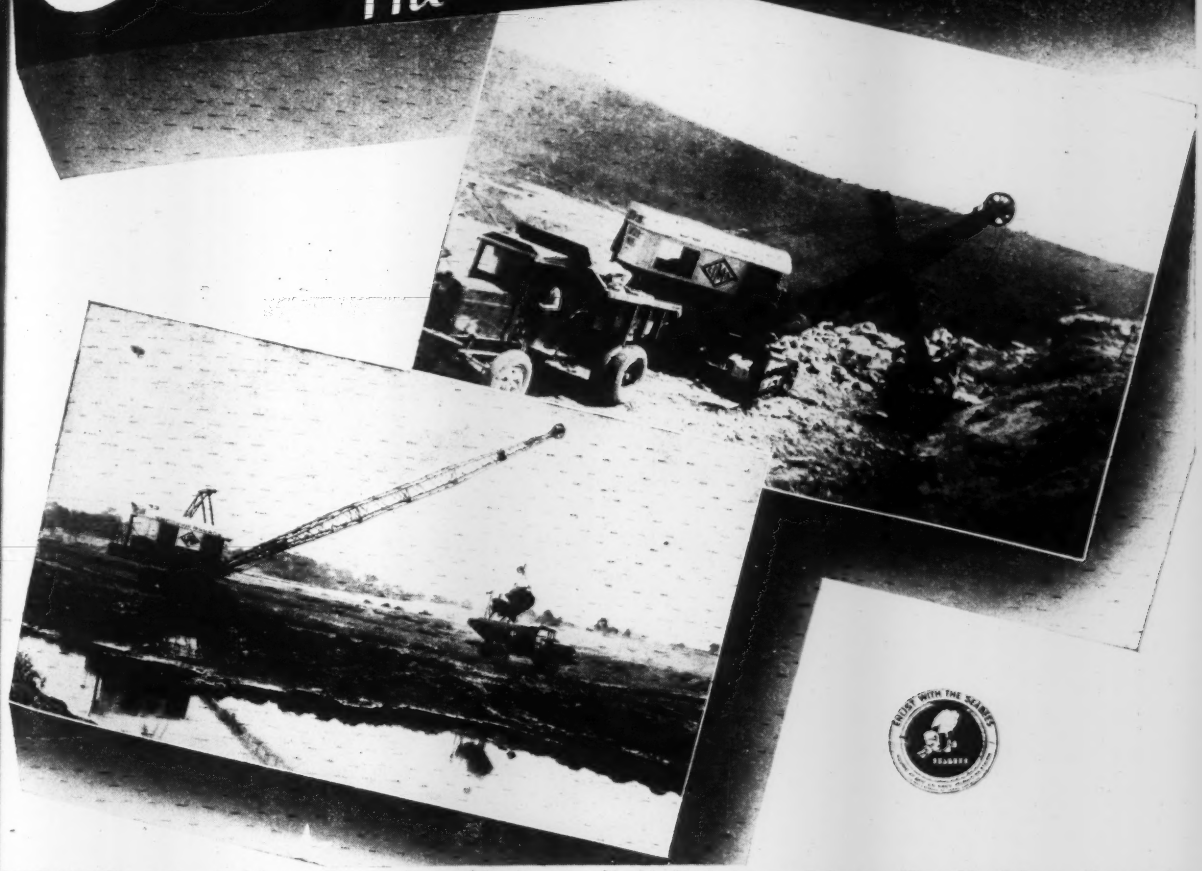
G. Haselton has been appointed divisio... engineer of the Portland division of the Southern Pacific Co., succeeding H. A. Hampton, who recently retired from active service.

A. L. Putnam, chief engineer in the area engineer's office at Fort Francis E. Warren, Wyo., is leaving to enter the armed forces as captain of engineers. Until 1942 he was resident engineer for the state highway department, which position he held for 11 years.

Kenneth H. Condit, dean of Princeton's School of Engineering, has been elected vice chairman of the Engineering Foundation of New York and will serve as a member of the Executive Committee and chairman of the Foundation's Research Procedure Committee.

J. J. Kasnitz, who has been connected with the engineering department of the Pennsylvania and Long Island Railroads for the past 15 years, has been commissioned a captain in the United States Army and will be assigned to a railway operating battalion made up of officers of the two railroads. His battalion will

30 LIMAS for The Arthur A. Johnson Corp. LONG ISLAND CITY N. Y.



SINCE 1935 The Arthur A. Johnson Corporation and its Associates have been buying LIMA Shovels, Draglines and Cranes, both gas and electric driven, for their important construction jobs throughout the country. Their first four LIMA Shovels were put to work on the Quabbin Reservoir Dike job near Enfield, Massachusetts. Then came the preparation of the New York World's Fair site, involving 7,000,000 Cubic Yards of excavation—*a rush job—where no delays could be tolerated*—so they bought eleven (11) more LIMA Shovels and Draglines. After that four (4) more were bought for New York's Sixth Avenue Subway. Then The Johnson Corporation and its Associates moved in on a gigantic earth moving project at Bermuda, where speed and continuous operation were the prime factors. For this job they purchased eleven (11) more LIMA Shovels and Cranes. The continued preference for LIMA Machines, year after year, is proof of the outstanding and profitable service that LIMA Shovels, Draglines and Cranes give their owners. Lima is proud to have had a part in many of the construction accomplishments of The Arthur A. Johnson Corporation.

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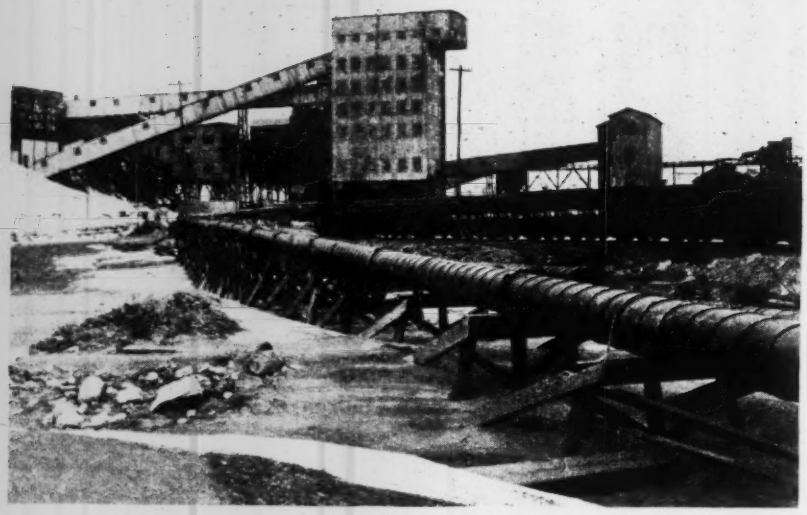
SHOVELS CRANES DRAGLINES **LIMA**

SHOVELS, ¾ YD. TO 3½ YD. CRANES, 13 TONS TO 65 TONS
DRAGLINES, VARIABLE

NO EXCESS BAGGAGE WITH NAYLOR LIGHT-WEIGHT PIPE



You wouldn't drive a carpet tack with a sledge hammer! And there's no need to use heavy-wall pipe when Naylor light-weight pipe can do the job.

There's no unnecessary weight in this streamlined light-weight pipe. Its exclusive Lockseam Spiralweld structure provides the extra strength, leak-tightness and safety to handle the "heavy" jobs — quicker, easier and more economically.

Once you have used this distinctive light-weight pipe and realized its many advantages, you'll want to specify Naylor.

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De-watering • Ventilating
Exhaust and Intake
Gas Gathering • Pulp Lines
Vacuum Lines • and other high or low pressure lines

ONLY NAYLOR GIVES YOU ALL THESE PERFORMANCE ADVANTAGES

- Light weight saves steel.
- Accurate in diameter.
- Concentric ends match correctly.
- Holds true cylindrical form.
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- Stronger — Safer.
- Absorbs shock loads.
- Stays tight and leakproof.
- Handles jobs normally requiring heavier-wall pipe.
- Cuts maintenance.
- High re-use value.
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- Lengths up to 40 feet.
- All types of fittings and connections.

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be called upon to oper[illegible] railroads in combat service overseas.

Lt. Paul M. Zander, who[illegible] three years was with the Little Rock[illegible] the office of the United States Engi[illegible] has been promoted to lieutenant [illegible]or grade) in the Navy Seebees an[illegible] somewhere in the South Pacific.

Paul A. Schneider, Decor[illegible]a., has been appointed highway divisi[illegible] maintenance engineer at Postville, Ia.[illegible] four Iowa counties, to succeed Carl [illegible] Cox, now a warrant officer in the n[illegible] engineers corps.

Paul W. Copenhaver, [illegible] equipment consultant, Harrisburg, Pa., has been appointed first lieutenant in the Army Engineers and has reported at the Engineer Replacement Center, Fort Belvoir, Va.

Joachim Fortin has been appointed district engineer for the Quebec Department of Agriculture, Drainage Division, Drummondville, Que. The drainage division was recently reorganized and district offices will be established at six different sections of the province.

Howard L. Dawson, chief engineer, Pittsburgh district, Carnegie Illinois Steel Corp., has been appointed assistant chief engineer of the company; Charles H. Williams, assistant to the vice president in charge of engineering, U. S. Steel Corp. of Delaware, succeeds Dawson in Pittsburgh.

Earl Pingry, formerly associate engineer with the U. S. Engineers at Biggs Field, El Paso, Tex., has been commissioned in the CEC of the U.S.N.R. He has reported for active duty at the Officers Training School, Camp Peary, Va.

Harry T. Ward of Detroit has been named deputy highway commissioner of Michigan, succeeding John C. Schaub, who will continue in the department on special assignment.

Colin McGregor, Little Rock, Ark., former partner in the contracting firm of McGregor & Picket, left May 14 to report to the Seabees at Williamsburg, Va. He holds a commission as lieutenant-commander.

W. A. Gayle, formerly city engineer of Montgomery, Ala., is now a lieutenant-colonel in the United States Army, and has been on foreign duty for some time.

W. O. Hogue, civil engineer, has returned to his home in Pocatello, Ida., after ten months of surveying and mapping for the Firestone Plantations Co. in Liberia, West Africa. He plans to return there in August.

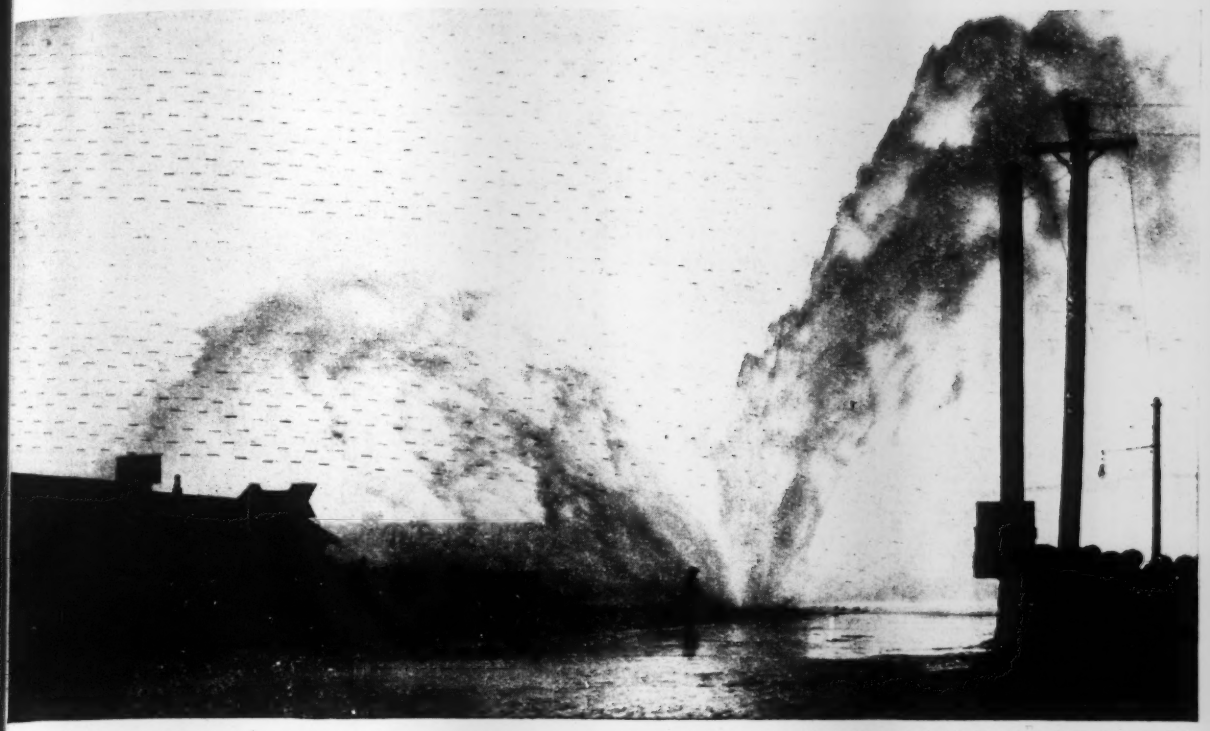
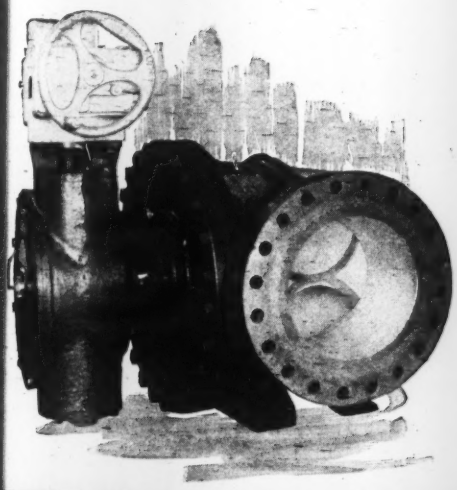


Photo Courtesy Rocky Mountain News, Denver, Colo.

A Picture *that speaks louder than words*



A MAJOR break, in a 36" pipe line, floods a busy section of an important city, causing business to stop and an enormous financial loss.

To remove the possibility of great damage due to rupture of flow lines or force mains, Rotovalves, arranged for Emergency Line Check Service, should be installed at strategic points such as: river crossings, flood areas or congested business and residential sections.

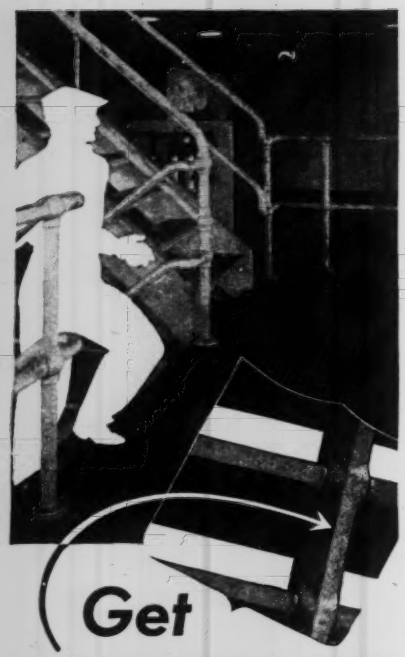
These valves will close automatically, in case excessive velocity exists in a pipe line, such as the rupture shown will cause.

As a double precaution, oil or water accumulator systems should be installed to prevent failure of the valve to operate, due to lack of water pressure.

Write for Rotovalves by Smith, Bulletin 140, and the suggestions of our Engineering Staff.

S·MORGAN SMITH COMPANY
YORK·PENNSYLVANIA~U·S·A·
If It's Hydraulics-Put It Up to Us·

POWER by SMITH



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BATES-GRATES
FOR YOUR OPEN STEEL FLOORING AND YOUR FLOORS, TOO, WILL BE CLEANER AND SAFER

See that scraper tread—and the crisp lines of the Hex cross bar? *That* gives a safer and cleaner tread and at the bottom of those cross bars you find clean, well-shaped fillets made by the metal displaced in the Bates patented process—no metal is lost. The weld is cleaner and stronger. The *floor* is cleaner and stronger. Yet, open steel flooring made under Bates patents costs no more.

Write for 8½ x 11 booklet that explains all details and shows many fine installations.

WALTER BATES COMPANY, INC.
JOLIET, ILLINOIS
OPEN STEEL FLOORING • STAIR TREADS

NEWS OF THE WEEK

(*Continued from p. 75*)

Traffic on rural roads in the East has decreased in the six months from December through May to less than half of pre-war normal, the Public Roads Administration of the Federal Works Agency reported on July 5, in announcing the May records of 519 automatic traffic counters in 40 states.

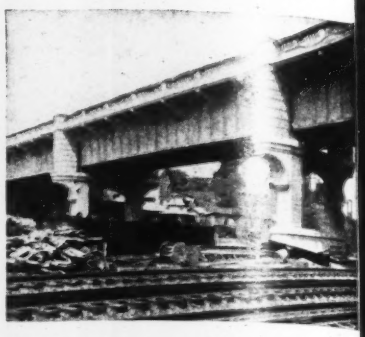
Motor-fuel tax collections totaled more than 31 million dollars in 28 states in May and indicated that total urban and rural traffic in the East used about 52 percent as much gasoline in April as in the same month in 1941. In the area rationed last December, gasoline consumption in April was about 73 percent of pre-war normal. For the entire country, April consumption amounted to about 64 percent of pre-war normal.

Sinclair Refining Co. announced July 13 that it has begun construction of a new petroleum products pipe line from Chicago to Toledo. The new link in the company's distribution network will increase volume and reduce costs on eastbound shipments of more than 30,000 barrels daily of gasoline and light heating oils. From the East Chicago refinery the line will run 220 miles across Indiana to the western end of Lake Erie. From the Toledo terminal tankers and barges will carry the products to Buffalo and other points, cutting 700 miles from the present tanker route around the Michigan peninsula. The cost of the line, with seven pump stations, will be approximately $4,500,000. A feature of the project is that all the pipe and station equipment to be used is reclaimed material.

El Salvador has sent four sanitary engineers to the Texas State Health Department at Austin, Texas, for a four months' course in sanitation. The course will include instruction in milk and food inspection, disposal of sewage, water supply, and control of malaria. Arrangements for this were made by the coordinator of Inter-American affairs.

Reversing a trend of several years, Charles M. Ziegler, Michigan State Highway Commissioner announced recently that contracts for maintaining state trunk-line highways in their counties would be awarded to the Kent and Ontonagon County Road Commissions. This will bring to 33 the number of counties having state maintenance contracts. The State Highway Department does its own

A VIADUCT IN PENNSYLVANIA



This photo is of a steel "GUNITED" viaduct over the Lehigh River, and the tracks of the L. V. R. R. and the New Jersey Central tracks, at Coplay (near Allentown), Pa. This job is illustrative of architectural effects possible by the use of "GUNITE".

Many examples of steel encasement by reinforced "GUNITE" are illustrated in our Bulletin 2200, and many other uses are shown. Send for a copy today.

The "CEMENT GUN" can be bought by anyone, and used without restrictions.

CEMENT GUN COMPANY
Manufacturers of the "CEMENT GUN"
ALLENTOWN, PENNSYLVANIA

WE ARE ALSO "GUNITE" CONTRACTORS
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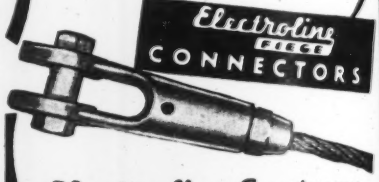
BECAUSE they have a special grip, Electroline-Fiege Wire Rope Connectors "hang on" under all conditions. The bite is tapered from rear to front. That dampens vibrations, thus preventing crystallization and fraying, gives you a positive connection and added rope life.

Electroline-Fiege connectors are safe (no molten metals to injure workmen or weaken wire rope.) streamlined, easy to install and economical. There are styles and sizes to fit every need. Write today for the interesting booklet, "Positive Grip". It is full of useful data.



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Which is Easier?

BUCKEYE Bulldozer and Trailbuilder moldboards *roll* the dirt. That means more capacity and more yardage in less time than if your tractors had to doze a dead weight load.

Buckeye blades are big — appreciably larger than many others because their proven ability to roll the dirt makes possible bigger loads with the same tractor power. Buckeye Trailbuilder moldboards, considerably greater in area than Bulldozer boards, are being successfully used in the straight-on or bulldozing position a great percentage of the time by many owners.

In the future, when you are buying dozers, remember Buckeye's moldboard curvature that *really rolls the load.*

ENLIST WITH THE 'SEABEES'

Remember **BUCKEYE**

for moldboards that *ROLL* the load!

BUCKEYE TRACTION DITCHER CO., Findlay, O.

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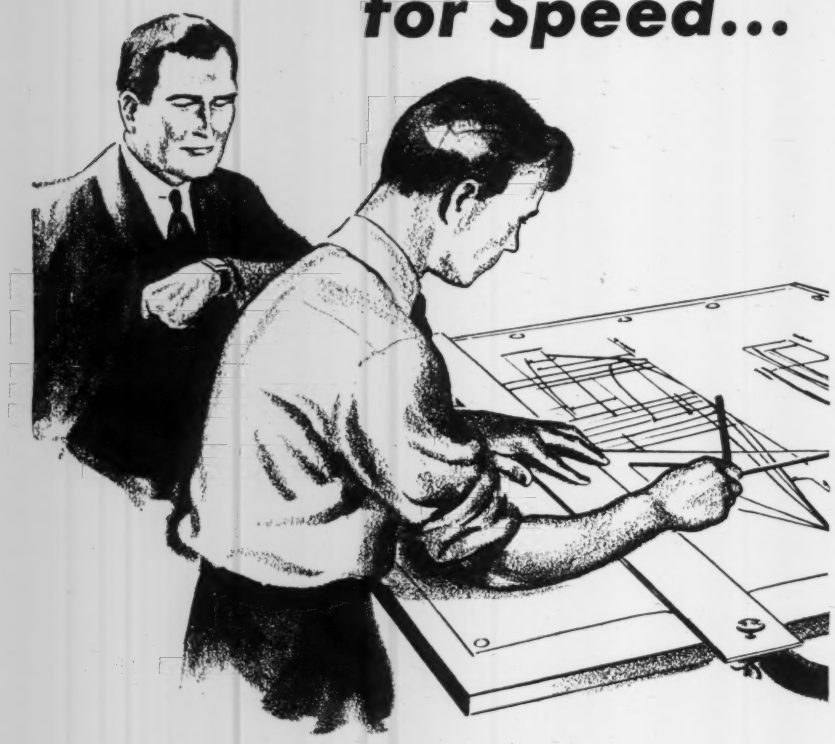
The greater the need for Speed...



...the greater the need for ARKWRIGHT TRACING CLOTHS!

If you're working under pressure, use Arkwright Tracing Cloths. Then you won't have to worry about erasures. You can erase easily and quickly because Arkwright Cloths have a smooth, almost smudge-proof surface. And you can ink over erasures neatly because both surface and base cloth are strong enough so they won't wear through. When time is important, choose tracing cloths carefully. Choose Arkwright! Arkwright Finishing Company, Providence, R. I.

Arkwright TRACING CLOTHS

AMERICA'S STANDARD FOR OVER 20 YEARS

maintenance in the other 50 counties. Mr. Ziegler indicated that other counties may obtain similar contracts, but emphasized that, in order to qualify, the county road commissions would have to meet rigid personnel and experience standards.

What is known as the Mitchell Lake Spillway on Highway 37 in Davison County, South Dakota, has been approved by the War Production Board and the new project will be immediately programmed, according to H. W. Meeker, state engineer. Before it can be advertised for bids, however, the project must be concurred in by the Federal Roads Administration. Two miles of grade and a new bridge will be needed to route traffic north of the old road. Lake Mitchell is artificial and was constructed by the municipality of Mitchell to supply water for the city several years ago. Culverts for the replacement road around Pierre army air base in Hughes County were also authorized by the War Department, according to Frank W. Mitchell, state highway secretary.

The North Carolina Highway and Public Works Commission on June 18 adopted maintenance budgets of $4,000,000 and $7,500,000 for state and

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Now! Without Priority

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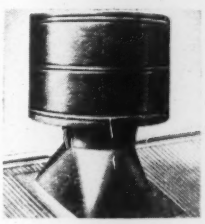
Repairs, Maintenance, Allowable Improvements will yield you Permanent Assets from Current Earnings. Use FELT-COTE

Government authority allows repairs, maintenance, and certain improvements as "deductible" items without priority rating (in accordance with L-41). Earnings not devoted to some constructive use will be taxed as "excess." As much as 80% of your FELT-COTE job may be offset by this one difference. Let us tell you how. Learn about the speed of installation and the long service life of *asbestos-protected* metal for corrugated Roofs and Siding and for Ventilators. Adequate supplies—prompt delivery.

In the production of FELT-COTE, high-quality steel sheets are coated, inside and out, with special asphaltic compounds prepared at the company's own distilling plant. They are then jacketed with superior long-fibre asbestos felt, which is itself impregnated with asphalt and bonded to the asphaltic undercoat by heat and pressure. Finally, a tough, elastic weatherproofing coat is added. Engineering service in the exact designing and patterning of FELT-COTE for each job, and erection service to make sure that it is correctly applied, have been developed on an extensive scale.



Steel mills, aluminum and magnesium plants, hangars, airplane assembly shops, repair docks, ordnance and munition works, warehouses and supply depots—industrial and Government-owned buildings in all parts of the United States and on every continent, are covered with FELT-COTE.

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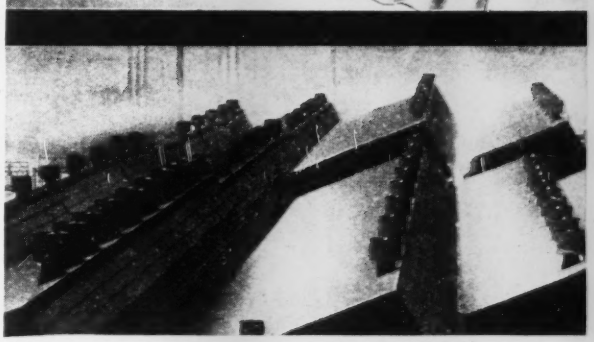

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ESTABLISHED 1891 **PLANT, CARNEGIE, PA.**

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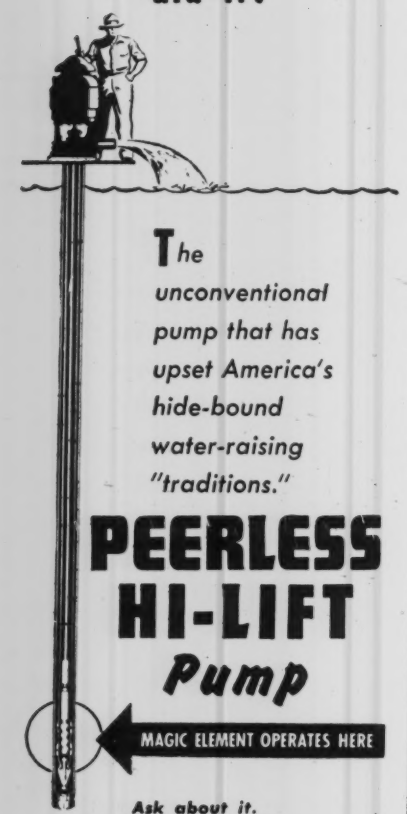
did it!



The unconventional pump that has upset America's hide-bound water-raising "traditions."

PEERLESS HI-LIFT Pump

MAGIC ELEMENT OPERATES HERE

Ask about it.

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county roads, respectively. The budget for the state roads provides $3,470,930 for maintenance of roads, $185,000 for maintenance of bridges, $44,070 for bridge and ferry tenders, and sets up $300,000 as a reserve fund to be used in emergencies. The budget for the county roads provides $6,192,510 for grading and upkeep of roads, $693,750 for maintenance of bridges, $51,240 for the bridge tenders and ferrymen, and sets up a reserve fund of $562,000 for emergencies.

The city council of St. John, N. B., has offered special concessions, including remission of taxes for three or four years, and installation of water and sewerage connections, to any person or firm agreeing to construct a number of houses, the plans being satisfactory to the city building inspector. The offer is based on urgency of additional housing because of the need to demolish many hundreds of old buildings which are unsanitary and fire traps. These cannot be razed until there are living quarters to which the present occupants of the condemned structures can move.

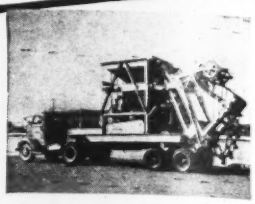
The City Executive Committee of Montreal, Canada, recently adopted a resolution authorizing a committee to make urgent representations to the Federal authority as to the need for immediate steps to deal with the housing crisis in Montreal. The resolution also instructed the city planning department to push ahead without delay a study of the city building by laws, to see whether any amendment could be made which would help alleviate the situation by removing restrictions or facilitating alterations to existing buildings.

Construction work has been begun by the Tennessee Valley Authority on a 776-ft. trestle for the Southern Railway across the little Tennessee River, just below the junction of the Nantahala and Little Tennessee Rivers in western North Carolina. The trestle will be 167 ft. above the bed of the river and it is expected to be ready to receive steel rails around Jan. 1, 1944. The cofferdam for the bridge has been completed and the pouring of concrete for the pier footings has been begun.

Barring breakdown of Bonneville and Grand Coulee generators which are carrying overloads and of transmission lines which are operating at capacity, and provided no big new war production loads are added, the Bonneville Power Administration has a good chance of getting through 1943 and most of 1944 without serious power shortage. That was the report of Paul J. Raver, Bonne-

ASPHALT MIXING PLANTS

STATIONARY and PORTABLE
In All Sizes and Capacities!



★ Hetherington & Berner asphalt mixing plants, products of the pioneer builder of asphalt machinery in America, incorporate the latest features of design which have been proved in performance. Specifications conform to the most rigid state and city requirements, both as to engineering design and safety regulations. *Write for Bulletin EN-260.*

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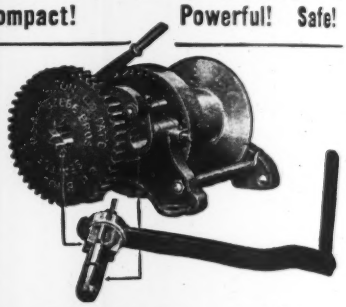

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Longest wooden trusses in world were installed with ONE 5-Ton Beebe after power hoists proved impractical.

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When raising, lowering, or placing costs by power are a serious problem, the answer is the right number of Beebe Bros. All Steel Hand Hoists MANNED IN UNISON. Available in 2, 5 and 15 Ton sizes. Sold through leading dealers in all trade centers. List of dealers sent upon request.

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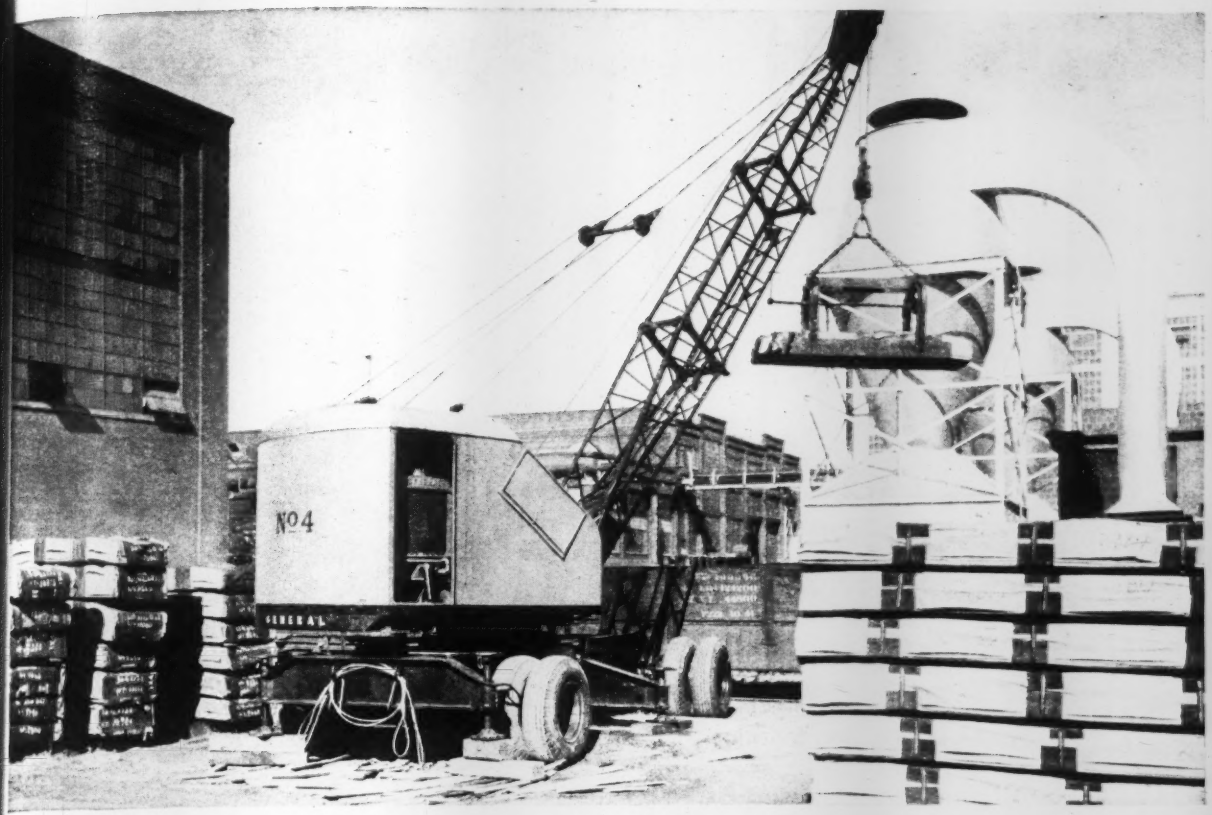

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recommends the continued purchase of War Bonds and Stamps—and the observance of preventive maintenance to keep your machinery running.

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The GENERAL SUPERCRANE is a necessity on jobs that require more work per day, more speed on the job, and lower operating costs.

How can the GENERAL SUPERCRANE do all these things? It is self-propelled—mounted on Pneumatic tires—operated by one man, and powered by one engine.

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Associated with
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The **HERCULES** COMPANY
HERCULES *IRONEROLLERS*
6 to 12 Tons
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SHOVELS
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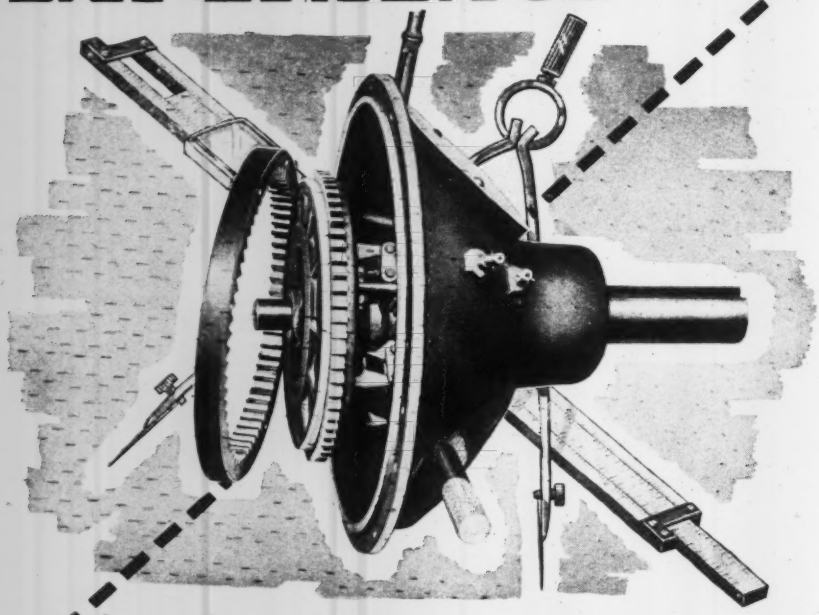
THE GENERAL EXCAVATOR COMPANY, Marion, Ohio

EXPERIENCE ----



---is a *Sound Designer*

In designing a product which will fully meet the job's requirements, experience plays a vital role at the drafting board. In the case of Twin Disc Power Take-offs, Twin Disc designers and engineers have been able to draw upon the wealth of experience gained from twenty-five years in the specialized business of manufacturing friction clutches.

This experience is evident in the rigid specifications which govern the manufacture of Twin Disc Power Take-offs . . . in the complete interchangeability of parts which facilitates service in the field . . . in the liberal safety factors built into bearings, shafts and all other parts which assure long wear-life . . . in the conservative ratings of clutch capacity which permits handling of emergency overloads without damage . . . in the provision for single-point adjustment without special tools.

These are among the many reasons why Twin Disc Power Take-offs are today the choice of both builder and user of so many types and so many makes of road building and material handling equipment.

Twin Disc Power Take-offs are suitable for application to all industrial engines with standard S.A.E. flywheel housing dimensions and having up to 285 hp. (1100 rpm.) maximum output.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
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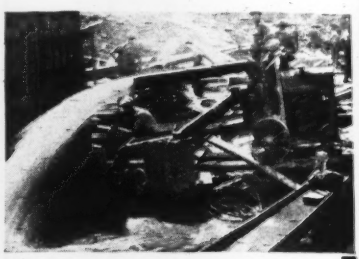
TWIN DISC CLUTCH COMPANY • RACINE, WISCONSIN

ville Administrator, on returning from a series of conferences in Washington Administrator Raver made it clear, however, that he concurs with warnings recently issued by the Bonneville Authority that unless additional storage facilities are provided to firm up Bonneville and Coulee power there will be trouble in 1945. Army engineers will soon complete the work of raising the height of Bonneville dam by six feet, thus firming up the power now provided by the seven generators now on the line. Generator No. 8 is expected to come in by August and Nos. 9 and 10 by January, 1944, thus completing the 10-unit Bonneville power house project.

A $600,000 airport will be begun at Owensboro, Ky., next spring, Senator Chandler said recently. The airport approval board, consisting of the Secretaries of War, Navy and Commerce, has given final approval to the project, which was requested by the War Department and recommended by the Civil Aeronautics Administration, the Senator said. The runways of the airport will be paved and will be at least 150 ft. wide and 4,500 ft. long.

The 1943 enrollment in the School of Engineering of the National University of Mexico, North America's oldest seat



Faster CONTINUOUS *Pumping* under all conditions

Contractors standardizing on Gorman-Rupp Pumps are getting extra hours instead of costly shut-downs due to pump failures. There's a *definite reason.* More dependable. No priming jet to clog. No control valve to jam. This is important today when every piece of equipment has to take a beating. Let your distributor show you why more contractors are switching to Gorman-Rupp's every day.

Distributors in more than 100 principal cities.

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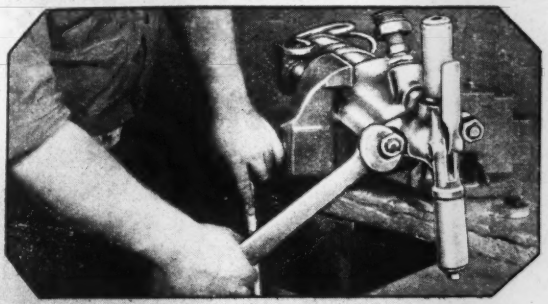
Self-Priming Centrifugal Pumps

Four Helpful Hints

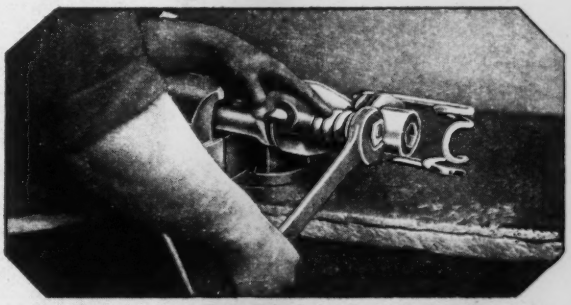
FOR OPERATORS OF DEMOLITION TOOLS

CP Demolition Tools, like CP Sinker Drills, are built to take it — hour after hour, day after day. With regular lubrication and a few simple check-ups, they give top performance in the toughest kind of demolition work. Illustrated are four easy-to-follow suggestions that will help you get maximum performance, longer spring life and minimum maintenance costs with CP Demolition Tools. Other helpful hints will appear in future advertisements.

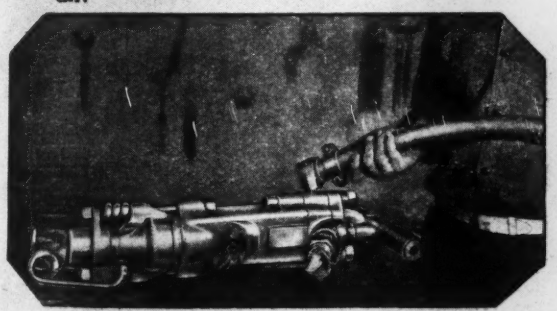
HOW TO GET MAXIMUM SERVICE FROM YOUR CP DEMOLITION TOOLS



1 Check backhead nuts every day. Keep them tight. If nuts are loose, tool will lose air.



2 Tighten fronthead bolt nuts evenly. Do not compress springs. Leave ⅛" space between coils.



3 Before putting tool away, clear with air hose. Plug air inlet and exhaust with rags or waste.

4 Even a CP Demolition Tool needs a sharp pcq point. Check points daily — keep them sharp.

★★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicycle...Universal)
ROCK DRILLS

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TOOL CP COMPANY
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AIR COMPRESSORS
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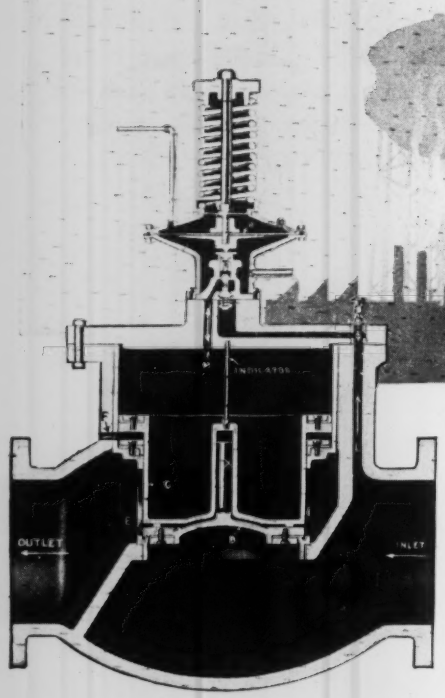
Protect Vital Storage Tanks



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Notable among the many G-A Valves built for special services is the Golden-Anderson Altitude Control Valve. Positive in action, this valve insures a constant, automatic water level at all times, with no overflow. Air and water cushioning prevents water and hammer shock. The G-A Altitude Control Valve is furnished in 2" to 36" sizes in globe or angle pattern . . . full bronze trim with no metal contacts. Write for your free copy of the G-A catalog . . . it describes the entire G-A line.

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GOLDEN-ANDERSON VALVE SPECIALTY CO.

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of learning, founded [illegible] 1553, is announced as 1,080. The [illegible] fall 1943 enrollment at the University [illegible] 20,075.

To keep bridges repaired in spite of the inability to inspect them frequently because of tire and gasoline rationing, County Commissioner [illegible] Marler of Waco, Tex., has asked residents of his precinct to notify him on a penny postal when they see bridges that need repairing. A record is kept of all the postals and telephone calls for bridge repairs and put on the daily work sheet of the bridge crew. Waco's county commissioners have also hired farmers to keep down roadside growth along county roads. The county does not have enough equipment to cope with the situation. The farmers are paid 80 cents an hour for mule-drawn mowers and $1.50 an hour if they use tractor mowers.

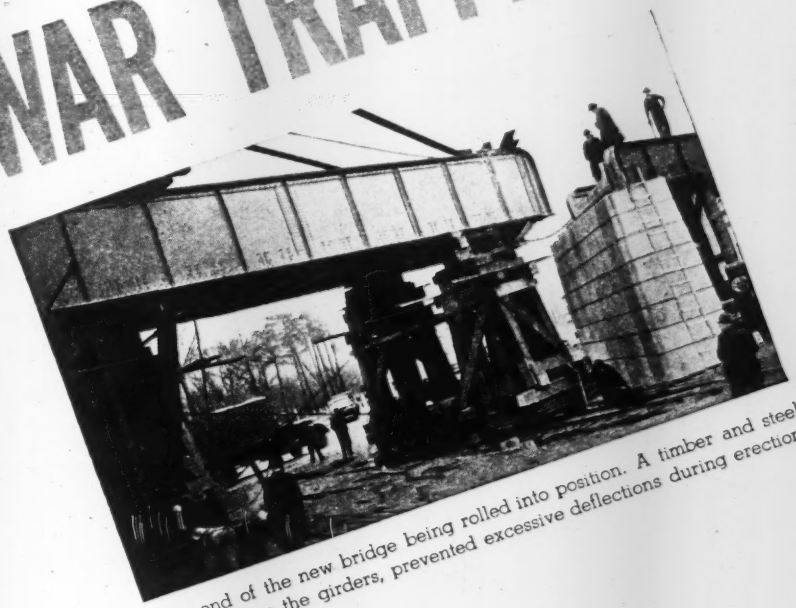
Corporation Counsel Barnet Hodes of Chicago ruled June 29 that the city is not empowered to pipe water beyond the city limits for the benefit of a suburban community, although it is required to sell water at the city limits to any suburb which lays pipes to that point. The opinion was rendered at the request of Oscar E. Hewitt, commissioner of public works, who had been asked by the city of Harvey if Chicago could pipe water to a Harvey reservoir four miles beyond the Chicago limits.

Dr. F. E. Giesecke, professor emeritus of heating, ventilating and air conditioning at Texas Agricultural and Mechanical College, College Station, Tex., was awarded the degree of civil engineering, his fourth engineering degree, by the University of Illinois on June 7. Dr. Giesecke has taught for 57 years at the University of Texas and Texas Agricultural and Mechanical College. During this period he designed and supervised many outstanding buildings of Texas A. & M. College and its three branches. Dr. Giesecke is a charter member of the Society for the Promotion of Engineering Education and past president of the Texas Chapter of the Society.

W. Vance Baise, chief engineer of the North Carolina Highway and Public Works Commission, has expressed the opinion that $50,000,000 and from three to four years' work will be required to put North Carolina's highways back into the shape they were before the war. Heavy wartime truck and bus traffic are doing considerable damage to the 60,000 miles of state and county roads in North Carolina, Baise said, and the department, because of wartime restrictions, is unable to do anything more than repair portions of the roads in the

BETHLEHEM STEEL

NEW BRIDGE BUILT WITHOUT INTERRUPTING WAR TRAFFIC

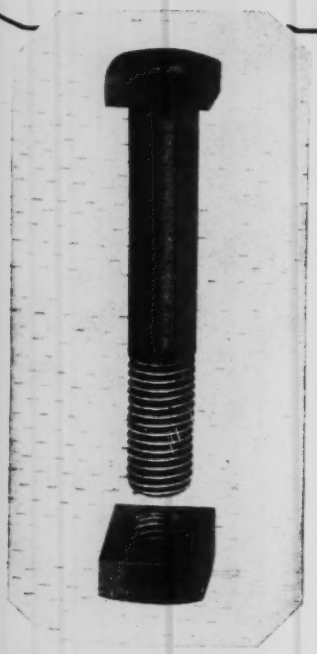


One end of the new bridge being rolled into position. A timber and steel frame, above the girders, prevented excessive deflections during erection.

War workers were able to continue commuting to their jobs and freight trains rolled along without interruption while Bethlehem recently built a new railroad bridge over the widened underpass on the busy Fort Dix-Trenton, N. J., highway.

Here's how Bethlehem accomplished the feat: The new bridge, consisting of one 55-ft. and one 18-ft. skew through girder spans, was built on timber falsework just off to one side of, and parallel to, the final position of the bridge. Falsework was mounted on railroad-type trucks on rails so that the entire structure could be rolled sideways into position. The bridge, being skewed, had to be built up on jacks so that, in placing, it could be raised to clear the abutment and then lowered again to the correct level.

After building up the falsework, the steelwork, totalling about 200 tons, was erected and riveted. The concrete deck was poured. Ties and trackwork were laid. When all was ready the temporary trestle carrying the railroad over the highway crossing was cut away and the new bridge was quickly rolled into position. Rails were connected to the roadbed track and rail traffic continued to roll, after which falsework was removed and other details were completed.



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STRONGER—Close-grained metal used; grain structure intensified by bolt-making processes and heat treatment.

TOUGHER—Cold-reduction of shank toughens skin surface for threading.

CLEANER—Threads *cold-worked;* strong, accurate, clean for quick assembly.

QUICKER—Point chamfered (60°) for ease in assembly.

*Up to ⅞" x 8"; larger sizes manufactured by another method.

EMPIRE NUTS*

STRONGER—Hole is punched at *right angles* to grain — no splitting.

TOUGHER—Processed to guard against stripped threads.

CLEANER—Tapping is done with frequently-changed taps.

QUICKER—Accurate tapping means nuts run on fast; counter-boring of hole means quick get-away.

*Regular nuts are processed cold through ⅞".

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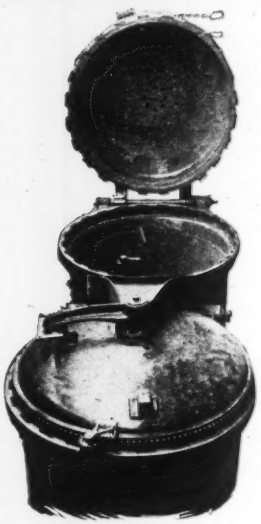
worst condition. At the same time Base said the department is ... to do little in the way of post-war planning because more than 90 per cent of its drafting department is gone.

The Louisiana State Board of Highways on June 22 took steps toward the construction of a new high-level bridge across Calcasieu River, Lake Charles, La., by authorizing the sale of $2,000,000 worth of bonds for completion of engineering work and acquisition of rights of way. Only $100,000 of the bonds are to be sold immediately. The board said the remainder of the $2,000,000 issue can be sold as soon as material is available.

Because of the decrease in the volume of military construction in the area supervised by the Charlotte, N. C., office of the Army Corps of Engineers, that office has been closed and its activities distributed among others, particularly those at Florence, S. C., and Columbia, S. C., it was announced recently by Captain Robert Ruffner, area engineer. Captain Ruffner is being transferred to Charleston, S. C., where he will be assistant chief of the operations division. Personnel of the Charlotte office will be distributed among the other agencies and offices of the government.

TANKS!



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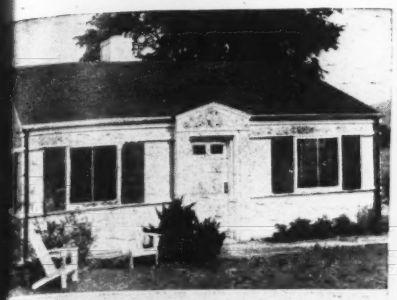
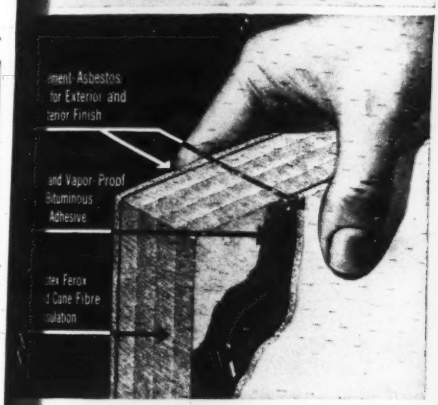
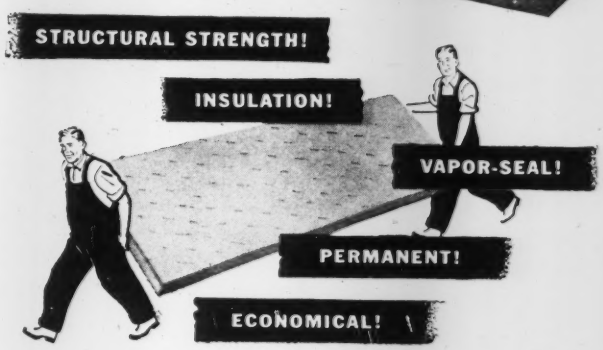


...ical of thousands of low cost Cemesto houses ...completed and thousands more under ...truction throughout the country— ...t with Cemesto wall units.

One of the many Cemesto war housing projects—the Arlington Farms Women's Dormitories, near Washington, D. C., as it will appear from the air.





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MEETINGS

AMERICAN PUBLIC HEALTH ASSOCIATION, wartime conference and 72nd annual business meeting, Hotel Pennsylvania, N. Y., Oct. 12-14.

AMERICAN WELDING SOCIETY, 24th annual meeting, Hotel Morrison, Chicago, Ill., week of Oct. 18.

FEDERATION OF SEWAGE WORKS ASSOCIATIONS, Chicago, Ill., Oct. 21-23.

PUBLIC WORKS CONGRESS, Hotel Sherman, Chicago, Ill., Oct. 24, 25, 26 and 27.

REGIONAL AND LOCAL MEETINGS

NEW ENGLAND WATER WORKS ASSOCIATION, Hotel Statler, Boston, Mass., Sept. 28-29.

NORTH DAKOTA WATER & SEWAGE WORKS CONFERENCE, Grand Forks, N. D., Oct. 5-7.

SOUTHWEST SECTION, WATER AND SEWAGE WORKS MANUFACTURERS ASSOCIATION, INC., Oklahoma City, Okla., Oct. 11-13.

MISSOURI VALLEY SECTION, AMERICAN WATER WORKS ASSOCIATION, Des Moines, Iowa, Oct. 12-15.

NEW JERSEY SECTION, AMERICAN WATER WORKS ASSOCIATION, joint meeting with Four-States Section, Benjamin Franklin Hotel, Philadelphia, Pa., Oct. 14-16.

WISCONSIN SECTION, AMERICAN WATER WORKS ASSOCIATION, Milwaukee, Wis., Oct. 19-20.

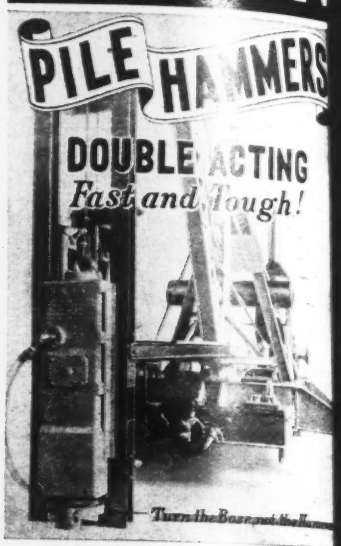
CALIFORNIA SECTION, AMERICAN WATER WORKS ASSOCIATION, Biltmore Hotel, Los Angeles, Calif., Oct. 27-29.

CANADIAN INSTITUTE ON SEWAGE AND SANITATION, annual convention, General Brock Hotel, Niagara Falls, Ont., Oct. 28-29.

Elections and Activities

New officers of the Engineers Club of Birmingham, Ala., are R. A. Polglaze, Warrior Water Co., president; Ernest D. Scott, Birmingham Electric Co., vice president; John T. Benton, of R. J. Reed Construction Co., secretary-treasurer. Directors: R. S. Poor, Birmingham-Southern College; Herbert S. Kent, Continen-

UNION



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WATER SUPPLY

PROPOSED WORK

O., Warren—City Council, new domestic water supply, $2,000,000. Havens & Emerson, Leader Bldg., Cleveland, engrs.

★**Texas**—East Texas Water Disposal Co., Tyler and Kilgore, drilling, casing, developing 6 new salt water disposal wells and facilities in oil fields, Smith, Rusk and Upshur Counties. $500,000.

Wis., La Crosse—Well, deep well pump, reservoir, high lift pump for addnl. water supply, southeast sect. J. H. Borth, city engr.

Wis., Wauwatosa—City 1 mg. reservoir for Blanchard St. well. M. F. Linnan, city engr.

BIDS ASKED

Bids Asked August 17

New York—Palisades Interstate Park Comn., Bear Mt. State Park, repairing 2 dams.

Bids Asked August 19

Pa., North Versailles Twp.—Bd. Comms. North Versailles Twp. Auth., Didon Ave., Fire Hall, Wilmerding, water works supply and distri. sys., Contr. 14, along Lincoln Hy. and 2 lateral lines, $36,231. Chester Engineers, 210 E. Park Way. N.W., Pittsburgh, engrs.

†**Tex., Mineral Wells.**—J. C. Miller, mayor, water imprvs., Contr. No. 2, Tex. 41-155A. Plans deposit $25, $35,000. J. J. Rady, Insurance Bldg., Fort Worth, engr.

Bids Asked August 24

Ill., Chicago—O. E. Hewitt, comr. Dpt. Pub. Wks. 406 City Hall, dry chemical feed equip., lime slackers, chlorinated scales, etc., plans deposit $25.; 36 slow mixers, 3 rapid mixers.

Bids Asked

†**Oklahoma**—U. S. Eng., 416 Wright Bldg., Tulsa 2, WW pump house, Sol. 957-Neg-44-24, Oklahoma Co. Est. $15,000.

CONTRACTS AWARDED

†**Alabama**—U. S. Eng., Grant St. west of Westwood St., Mobile, waterworks imprvs., Calhoun Co., to T. H. Pearce & Co., Edgewood Circle, Columbus, Ga., under **$100,000.** BA 7/28. CD 7/23.

†**Florida**—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, water and sewage distr. sys., Neg-Jax--43-669, Polk Co., to Cleary Bros. Constr. Co., Georgia Ave., West Palm Beach, under **$50,000.** Awarded 7/22.

†**Ia., Ankeny**—Town, enlarging water and sewerage sys., incl. new wells, sewage pump. sta., 2 tanks, filter bed, Ia. 13-128, to E. B. Spencer Const. Co., 111 Home Park Blvd., Waterloo, **$23,041.** FWA. CD 7/17—ENR 7/29, under "Sewerage and Waste Disposal."

†**Massachusetts**—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., addl. water supply sys., Contr. 699-Eng-2467, Bristol Co., to C. W. Lauman & Co., 50 Church St., New York, N. Y. Under **$50,000.**

†**Nebraska**—U. S. Eng., 1709 Jackson St., Omaha, wells, Red Willow Co., to Layne-Western Co., World Herald Bldg., Omaha, under **$50,000.**

†**Washington**—U. S. Eng., 800 3 Ave., Seattle, 4, water and electric distr. sys., King Co., to L. Coluccio, 512 21 Ave. S., Seattle, 44. Under **$50,000.** CD 8/3—ENR 8/5.

†**Washington**—U. S. Eng., 800 3 Ave., Seattle, 4, water sys., King Co., to West Coast Constr. Co., Textile Tower, Seattle, 1, **$100,000-$500,000.**

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Conn., Stratford—Wm. H. Shea, Town mgr., Town Hall, plans sewerage disposal plant, $800,000. M. J. Jankowski, town engr. Applied for FWA funds. (**Correction**—type of work) CD 7/28—ENR 8/5.

Mich., Dearborn—Bids soon $0 ton daily capacity sludge incinerator, West Side Incinerator plant, 35x40 ft., brick bldg. with stack. $150,000. F. Storrer, city engr.

★**O., Willoughby**—Bd. Comrs. Lake Co., Court House, Painesville, preliminary plans, sewage disposal plant, distr. lines. Total est. $1,512,700. Havens & Emerson, Leader Bldg., Cleveland, engrs. Will probably seek Federal assistance.

†**Utah, Clearfield**—Town, G. H. Holt, pres. Town Bd., sanitary sewerage sys. $156,000. FWA.

Location of ENR Correspondents

Symbols and Abbreviations Include:

†	Federal Government
★	Project of $500,000 or over
ENR	Engineering News-Record
CD	Engineering News-Record Construction Daily
A-E-M	Architect-Engineer-Management type of contract

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Named in order of Listing)

Water Supply	Unclassified
Sewers, Waste Disposal	Latin America
Bridges	Public Buildings
Streets & Roads	Commercial Buildings
Earthwork, Waterways	Industrial Buildings

Stages Reported

PROPOSED: (except Streets & Roads):

BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR):

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

Note: To comply with censorship requirements, addresses on some reports are being generalized. Data which would reveal the purpose of the improvements and the size are withheld. The name of contractor and general area are reported.

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†**Washington**—U. S. Eng., 800 3 Ave., Seattle, Zone 4, sanitary sewer, Neg. No. 703, King Co.

BIDS ASKED

Bids Asked August 23

†**Pa., Aliquippa**—Federal Works Agency, 101 Park Ave., New York, 17, N. Y., 742 lin. ft. 8 in. sanitary sewer and 640 lin. ft. 12-to-18 in. storm sewer lines Gregory St. and Monaca Rd., Pa. 36-197. FWA; Plans deposit $15; Adv. ENR 8/12.

†**Tex., Nederland**—Mayor, City Hall, sewer imprvs., Tex. 41-593, $35,000. Chas. P. Smith, Bancroft Bldg., Orange, engr. CD 7/7—ENR 7/15.

Bids Asked August 25

Calif., Los Angeles—Bd. Pub. Wks., City Hall, sanitary vit. clay pipe sewer, Baird Ave. and Gault St., **$81,271.** L. Aldrich, City Hall, engr.

Bids Asked About August 26

†**Va., Bowling Green**—Town, 23,000 ft. 6, 8 and 10 in., concrete or vit. clay sewer lines and primary sewage treatment plant. $80,750. FWA. Plans deposit $5. R. Stuart Royer, Builders Exch. Bldg., Richmond, engr.

LOW BIDDERS

Calif., San Francisco—City, Dpt. P. Wks., Aug. 4, concrete sewer, 15 and Church Sts. from Eaton & Smith, 715 Ocean Ave., **$116,468.** CD 7/20. ENR 7/22.

La., New Orleans—Sewerage and water Bd., Aug. 3, rein.-con. sewers in Franklin Ave., Odin, Spain, Mendez, Painters and Frankfort Sts., from Bob Bros. Constr. Co., 2400 Cypress St., **$78,402.** CD 7/26—ENR 7/29.

†**Maine**—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., August 6, sewage treatment plant, Me 17039, from G. P. Friel, 42 Wyman St., Medford, Mass., **$31,795.** A. J. Harriman, 415 Congress St., Portland, archt. CD 7/29.

Md., Towson—Comrs. Baltimore Co., 8070 lin. ft. 8 and 10 in. sewers Contr. 75 S. from Gaines & Bantz, 212 Washington Ave., **$40,510.** G. W. Stephens, Courthouse, engr. CD 7/20—ENR 7/22.

†**Okla., Norman**—At office City Clerk, July 30, sanitary sewers, Okla. 34-178, from Ransdell Constr. Co., Liberty Bank Bldg., Dallas, Tex., **$194,000.** Est. $75,000. FWA. R. M. McCool, city mgr. CD 7/16—ENR 7/22

†**Pa., Ellwood City**—Boro, E. E. Moyer, clk., Municipal Bldg., interceptor sewer and chlorination plant, part Proj. Pa. 36-154, from Deblasio Constr. Co., 2914 Southern Blvd., Youngstown, O., **$72,760.** Chester Engineers, 210 E. Parkway N.S., Pittsburgh and L. W. Monroe, Municipal Bldg., Pittsburgh, engrs. CD 6/9.

CONTRACTS AWARDED

Ga., Columbus—Bd. Comrs. Muscogee Co., sanitary sewer extensions, to W. C. Shepherd & Co., Briarcliff Rd. N.E., Atlanta, **$61,093.**

†**Ga., Perry**—City, sewer imprvs., Docket GA 9136 to E. M. Beckham, **$72,350.** Wiedeman & Singelton, C and S Bank Bldg., Atlanta, engrs. CD 7/28.

†**Massachusetts**—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., sewerage sys., Bristol Co., to John Bowen Co., 129 Newbury St., Boston. Under **$50,000.** Bids 8/5. CD 8/3.

†**Nebraska**—U. S. Eng., 1709 Jackson St., Omaha, incinerator, Scotts Bluff Co., to Fullen Constr. Co., Scottsbluff, under **$50,000.**

BRIDGES

PROPOSED WORK

Pa., Pittsburgh—Bd. Commrs. Allegheny Co., County Office Bldg., bridge and road constr., Levi Bird Duff, engr.

Tex., Dallas—Texas & Pacific Ry. Co., R. J. Gammie, ch. engr., Texas & Pacific Bldg., overpass adjacent to American Aviation plant near Grand Prairie, Dallas Co.

Washington—State Hy. Dpt., Olympia, bridge over Spokane River from Riverside and Oak to Broadway and Ash, Spokane Co.

Que., Sherbrooke—Dpt. P. Wks., Quebec City, reconstr. Petit Canada Rd. Bridge, Knight Bridge, Wilson Bridge, Lepage Bridge all foregoing over Salmon River, 200 ft. Moe's River Bridge, in Ditton Twp.

BIDS ASKED

Bids Asked August 25

California—State Div. Hys., Pub. Wks. Bldg., Sacramento, rein.-con. box culvert at Elk Creek, Del Norte Co. G. T. McCoy, state hy. engr.

Louisiana—State Dpt. Hys., Baton Rouge, 163 ft. creosoted timber overhead cattle pass earth embankment approaches, Rapides Parish.

Bids Asked September 1

Tenn., Huntsville—Scott Co. Rd. Comm., c/o Geo. W. Rector, supt., 182 ft. steel span bridge, stone piers, at Smokey Jct., near Jasper.

LOW BIDDERS

Ark., Hope—A. Groves, mayor, underpass under railroad tracks, Hempstead Co., from Ben Sira & Co., 3301 Elm St., Dallas, Tex., **$26,662.**

Illinois—State Div. Hys., Springfield, July 30, reconstruction portion of I-Beam bridge over Wolf Lake on Route 87 north of Chanlerville, Mason Co., from Fairview Constr. Co., Decatur. **$59,458.** CD 7/22.

Mass., Waltham—City, Dpt. Pub. Wks., Aug. 4, stone faced bridge over Charles River, Moody St., from Berke Moore Co., Inc., 11 Boylston St., Boston, **$129,200.** Est. $130,000. CD 7/27—ENR 7/29.

Michigan—State Hy. Comm., Lansing, July 28, rein.-con. grade separation carrying Schaefer Rd. over Detroit Industrial Expressway and sect. of Dual Lane, Wayne Co., from L. A. Davidson, 213 E. St. Joseph St., Lansing, **$315,472.** CD 7/15.

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BRIDGES (Low Bidders, [illegible])

Michigan—State Hy. Dpt. [illegible] rein.-con. grade separation [illegible] trial Expressway over For[illegible] 10, Dearborn, from Fry & [illegible] St., Lansing. **$174,787.**

CONTRACTS AWARDED

Pa., New Castle—Comm[illegible] Court House, repairing 220 [illegible] roadway, to Conn Welding [illegible] Est. **$25,000.**

STREETS AND ROADS

BIDS ASKED

Bids Asked August 16

†**R. I., Newport**—City, Dpt. [illegible] City Hall, widening, paving [illegible] 37150. Est. $25,000. Plans [illegible] date change. CD 8/5—ENR [illegible]

Bids Asked August 17

South Carolina—State Hy. Dpt., State Office Bldg., Columbia, asphalt surfacing, cement paving 8.431 mi., Spartanburg Co., [illegible] Millan, state hy. engr.

Bids Asked August 18

Md., Baltimore—City, Bd. Awards, City Hall, sheet asphalt paving Ashburton St. from Rayner to Lafayette Aves. Contr. S. A. 776, Bureau Hys., Municipal Office Bldg., engrs.

Bids Asked August 20

Minnesota—State State Hy. Dpt., 1246 University Ave., St. Paul, grading, stabilizing [illegible] mi. S.P. 4002-18 (Trunk Hy. 13-13), and S.P. 4005-04 (TH 21-21) between Montgomery and New Prague; 3.4 mi. S.P. 4003-03 (TH 99-2) between LeCenter and Junction, TH No. 21, bridge No. 6375, Special C 64x80 ft., concrete box culvert, over Drainage Ditch, at Crosby, S.P. 1806-07 (TH 210-21). Plans deposit 25c, 70c. and 35c. respectively. O. L. Kipp, ch. engr.

Bids Asked August 25

California—State Div. Hys., G. T. McCoy, engr., Pub. Wks. Bldg., Sacramento, grading shoulders, median strip and applying bituminous surfacing treatment 6.5 mi. between San Luis Obispo and Pennington Creek, San Luis Obispo Co.

Bids Asked August 26

California—State Div. Hys., G. T. McCoy, engr., Pub. Wks. Bldg. Sacramento, plant mix material repairing 2.3 mi., Harvard St. between West City Limits of Santa Paula and Main St., Ventura Co.; grading, concrete paving 0.5 mi., shoulders, Fries Ave., La Paloma Ave. and Falcon Sts., from Anacapa St. to San Celemente Ave., Los Angeles Co.

Bids Asked September 6

La., New Roads—Pointe Coupee Parish, enlarging, black topping streets, east, west and north side Courthouse.

LOW BIDDERS

California—State Div. Hys., 808 State Bldg., Los Angeles, Zone 12, July 29, asphaltic concrete repairing 4.5 mi. Riverside Co., from E. L. Yeager, P. O. Box 87, Riverside, $52,396. G. T. McCoy, state hy. engr. CD 7/12—ENR 7/15.

California—State Hy. Dpt., 808 State Bldg., Los Angeles, Zone 12, July 23, grading, concrete and asphaltic concrete surfacing 2.4 mi. San Diego Co., from Griffith Co., 502 Los Angeles Railway Bldg., Los Angeles, $208,486. Est. over $25,000. CD 7/20.

California—State Div. Hys., Pub. Wks. Bldg., Sacramento, improving 8.9 mi., Solano and Napa Counties, from J. A. Casson & N. M. Ball & Sons, Box 404, Berkeley, $442,100; 3.2 mi., Mendocino Co., from Louis Angelus Co., 330 Bway., Oakland, $28,957; 4.7 miles, Del Norte Co., from Marshall S. Hanrahan, Box 429, Redwood City, $49,652. CD 7/19 and 7/22—ENR 7/22.

†**Florida**—U. S. Eng., Grant St. west of Westwood St., Mobile, Ala., paving, Okaloosa Co., to E. J. & W. L. Cobb, Bell Bldg., Montgomery, Ala., **$100,000-$500,000.**

Georgia—State Hy Dpt., Atlanta, Aug. 6, imprv. 53.6 mi. Gwinnett, Dawson, Pickens, Gilmer Barrow Jackson Counties, Contr. 8, also 47.2 mi. Twiggs, Baldwin, and Washington Counties, Contr. 9, from A. W. Ledbetter, Rome, $65,997 and $68,714 respectively ***20. 1 mi. Taylor and Crisp Counties, Contr. 10 also 29 mi. Jeff Davis and Telfair Counties, Contr. 13, from C. M. Lyle Constr. Co., Gainesville, $28,801 and $51,971 respectively ***28.4 mi. Coffee, Contr. 12, Ben Hill and Berrien Counties, from Southeastern Constr. Co., Ozark, Ala., $42,318. CD 8/3—ENR 8/5.

★**Idaho**—State Dpt. Pub. Works, Boise, July 30, road bed and drainage structures 16.059 mi., McCall-Stibnite Rd., from Lick Creek Summit to South Fork of Salmon River, DA-WM-4-A(2) Valley Co., from Colonial Constr. Co., 326 First Ave., Spokane, Wash., $687,396.

Illinois—State Div. Hys., Springfield, July 30, bituminous resurfacing 1.2 mi., Fourth Ave., from Chicago Ave. east to Richards St., and on Richards St., Jefferson St. and Collins St. from Fourth Ave. north to Cass St. Will Co., from Walsh Oil Co., Joliet, $42,260. CD 7/22.

Ill., Chicago—Dpt. P. Wks., July 28, con-

STREETS and ROADS (Low Bidders, Cont'd.)

crete paving, E. 76 St., S. Stony Island to S. Jeffery Ave., from Calumet Coal Co., 9540 S. Marquette St., **$67,179.** CD 7/20—ENR 7/22.

Maryland—State Rds. Comn., Baltimore, Aug. 3, grading, draining, concrete surfacing, 2.136 mi. hy. from west end Sandy Point Ferry Terminal Hy. towards Governor Ritchie Hy. from Empire Constr. Co., $1 S. Calvert St., Baltimore, **$221,616.**

Maryland—State Rd. Comn., Baltimore, scarifying, draining, macadam surfacing 0.8 mi. Cresaptown-Keyser Rd. to Kelly Ordnance Depot, Alleghany Co., from Cumberland Contracting Co., Cumberland, **$29,222.** CD 7/20—ENR 7/22.

Md., Baltimore—City, Bd. Awards, Aug. 4, concrete paving alleys, Contr. CC 161, from Arundel Constr. Co., 910 Trinity St., Baltimore, **$40,575.** CD 7/26—ENR 7/29.

Michigan—State Hy. Dpt., Lansing, Aug. 4, prepared sand gravel subbase and crushed limestone surfacing, grade crossings, Wayne and Washtenaw Counties, from Gerritt Posthumus, Pierson, **$64,793.**

†Oregon—Pub. Roads Admin., New P.O. Bldg., Portland, July 30, constructing Suthrlin-Nonpareil timber access road, Douglas Co., from Salem Sand & Gravel Co., Salem, **$66,925.**

★**†Texas**—U. S. Eng., 231 W. Main St., Denison, asphalt and concrete paving, Dallas Co., from Texas Bitulithic Co., 111 W. Commerce St., Dallas, **$500,000-$1,000,000.**

Washington—State Hy. Dpt., Olympia, August 3, ballasting, surfacing 9.94 mi., Kitsap Co., from G. F. Norris and Goodfellow Bros., 324 N. 85 St., Seattle, **$99,253.** CD 7/20—ENR 7/22 under BA.

CONTRACTS AWARDED

†Alabama—U. S. Eng., Grant St. west of Westwood St., Mobile, gravel surfacing roads, walks, Contr. 569-eng-5253, Mobile Co., to Foster and Creighton Co., American National Bank Bldg., Nashville, Tenn., under **$50,000.**

Arkansas—State Hy. Dpt., Little Rock, imprvs., 2.102 mi., Conway Co., to Reynolds & Sutton, Tyler, Tex., **$28,077.** CD 7/21.

†Florida—U. S. Eng., Grant St. west of Westwood St., Mobile, Ala., walkways, outside utilities, Bay Co., to M. D. Saxon, 2106 Coosa St., Montgomery, Ala., under **$50,000.**

†Florida—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, roads, walks, Neg-Jax-43-889, Polk Co., to John E. Ballenger Constr. Co., Lakeland, under **$50,000.** Awarded 6/30.

Idaho—State Bureau Hys., Dpt. Pub. Works, Boise, road mix bituminous surfacing 10.753 mi., North and South Hy. from Cottonwood to Lawyers Canyon, S.P. 46-C, Idaho Co., to S. Birch & Sons, Ford Bldg., Great Falls, Mont., **$25,557.** Bids 7/30.

†Maine—U. S. Eng., 31 St. James Ave., Boston, Mass., concrete paving roads, 19-023-44-Neg 9-B, Aroostook Co., to Lane Constr. Corp., 37 Colony St., Meriden, Conn., **$50,000-$100,000.** Bids asked 7/30.

†Missouri—U. S. Eng., 10 E. 17 St., Kansas City, Mo., stabilized aggregate base course, Jefferson Barracks, Contr. 461-Eng-12005, to Cameron, Joyce & Co., Keokuk, Ia., under **$50,000.**

Ohio—State Hy. Dpt., Columbus, August 3, imprv. 28.69 mi., Guernsey and Muskingum Counties and 21.81 mi., Licking, Muskingum and Perry Counties to Allied Corp., 714 Keith Bldg., Cleveland, **$50,444** and **$34,736** respectively, Est. $51,708 and $34,836 respectively ***1.350 mi., Montgomery Co., to O'Connell & Sweeney, Inc., Kellogg and Tennyson Sts., Cincinnati, Zone 26, **$323,613*****0.933 mi., Cuyahoga Co., to The Cuyahoga Asphalt & Paving Co., 13125 Shaker Sq., Cleveland, **$25,382.** No Bids received 0.453 mi., Ottawa Co.; Est. $46,700; 2.726 mi., Cuyahoga Co., $50,600; 28.76 mi., Mahoning and Stark Counties, $44,651. Grand Total $434,174. Bids asked 8/3. CD 7/30.

O., Cleveland—Bd. Comrs. Cuyahoga Co., G. H. Stahler, clk., Court House, resurfacing Cedar Rd., to Cuyahoga Asphalt & Paving Co., 13125 Shaker Sq., **$26,493,** est. $27,000; J. O. McWilliams, Standard Bldg., co. engr. Bids July 27; awarded July 30.

O., Chagrin Falls—Bd. Comrs. Cuyahoga Co., G. H. Stahler, clk., Court House, Cleveland, resurfacing Bell St., to Wm. L. Schloss, McCracken Rd. and Penna. R.R., Cleveland, **$27,100,** est. $27,800. J. O. McWilliams, Standard Bldg., Cleveland, co. engr. Bids 7/27. Awarded 7/30.

†Oklahoma—U. S. Eng., 231 W. Main St., Denison, Tex., asphalt and concrete paving, Tillman Co., to R. W. McKinney, Nacogdoches, Tex., **$100,000-$500,000.**

†Oklahoma—U. S. Eng., 231 W. Main St., Denison, shoulder dust control or dust palliative, Jackson Co., to Drake Constr. Co., Muskogee, **$50,000-$100,000.**

★**Oregon**—State Hy. Comn., State House, Salem, imprv. 3.9 mi. Clatsop Co., to C. H. Wheeler, Pittock Block, Portland, **$393,903*****0.4 mi. Coos Co., to Newport Constr. Co., 7031 N. E. Halsey St., Portland, **$65,093*****12.51 mi. and 5.98 mi. Polk Co., to Peter Kiewit Sons, 4521 Dodge St., Omaha, Neb., **$387,570***** 19,000 cu. yd. Tillamook Co., to A. H. Saxton & Sons, Corvallis, **$67,760.** Grand total $914,326. Bids July 28. CD 7/20.

Pa., Pittsburgh—F. M. Roessing, Dir., Pub. Works, City-County Bldg., hillside imprvs., removing dangerous rock from Noblestown Rd. Allegheny Co., to The Pavia Co., Verone Rd., Verona, **$31,090.** H. S. Ayres, 335 City-County Bldg., engr.

†R. I., Newport—City, Dpt. Streets & Highways, City Hall, paving, storm and sanitary sewers, etc., Hillside Ave., Beacon St., RI 37151, to Callan Constr. Co., 539 Hope St., Bristol. Est. **$44,000.** FWA. Bids 7/29. CD 7/7—ENR 7/15.

Tex., Houston—Harris Co., asphalt Work, Precinct 3, to Humble Oil & Refining Co., Humble Bldg., Houston, approx. **$32,000.**

Utah—State Rd. Comn., Salt Lake City, imprv. 2.006 mi. Salt Lake Co., to J. W. Whiting Constr. Co., Springville, **$32,443.** Est. $38,545. Bids 7/27. CD 7/23.

†Washington—U. S. Eng., 800 3 Ave., Seattle, 4, addl. surfacing, Kittitas Co., to S. Birch & Sons Constr. Co., P. O. Box 237, Ellensburg, **$100,000-$500,000.**

Washington—State Hy. Dpt., Olympia, grading, draining, paving, surfacing 2.5 mi., Snohomish Co., to C. V. Wilder Co., 2006 State St., Bellingham, **$75,025.** CD 7/20—ENR 7/22.

†Washington—U. S. Eng., 800 3 Ave., Seattle, 4, surfacing roads and streets, Spokane Co. to J. H. Collins, P.O. Box 56, Spokane, **$100,000-$500,000.**

West Virginia—State Rd. Comn., Charleston, grading, draining, Macadam base and

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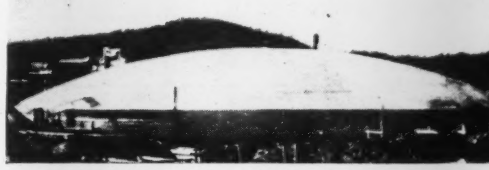

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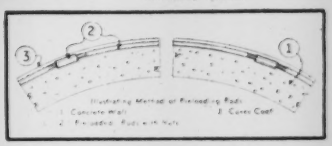

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STREETS and ROADS (Cont'd.)

asphaltic concrete surfacing ... Creek Culvert and approaches ... 25, U. S. Route 35, Proj. ... nawha Co., to J. A. Archer ... Va., **$124,748**; 0.06 mi. Kno... ondary Route 9, Proj. DAW... Co., bid rejected. CD 7/2...

EARTHWORK, WATERWAYS

PROPOSED WORK

Ia., Muscatine—City, ... levee on Mississippi River ... Howenstine, city engr. ... for same.

Louisiana—The Texas Co., ... St., New Orleans, dredging ... Parish.

Mich., Hillsdale—City, H. ... Bd. Pub. Wks., dredging, ... river bottom. $25,000.

BIDS ASKED

Bids Asked August 26

Minn., Blue Earth—G. ... Auditor, drainage, clean open ... of Co. Ditch 7, 25,760 cu. yd. ... 8, 13,450 cu. yd. excav., etc., ...

Tex., Mineral Wells—J. ... dam imprvs., Lake Mineral ... Rady, Insurance Bldg., Fort ... $35,000. Plans deposit $10.

Bids Asked

†**Texas**—U. S. Eng., ... veston, Brazos River flood ... C5, Galveston Co. Over $15,000.

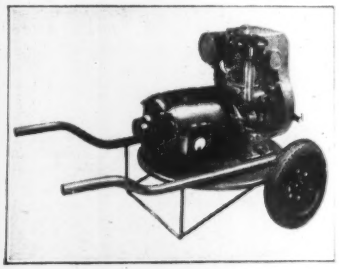
LOW BIDDERS

Md., Baltimore—City, Bd. ... maintenance dredging Baltimore ... Arundel Corp., Pier 2, Pratt ... **$47,435.** CD 7/30.

CONTRACTS AWARDED

†**Arkansas**—U. S. Eng., ... phis, 1, Tenn., approx. 1,030,000 ... work, White River Levee Dist., ... Phillips Co., to Gerald Smith ... St., Memphis, approx. **$300,000**... Monroe and Prairie Counties ... Brothers Constr. Co., Petroleum ... homa City, Okla., approx. **$10,000**... cu. yd. earthwork and 1,440 ... stone to R. J. Reid Contracting ... 14 St., Birmingham, Ala., and ... earthwork, Sol. 40-041-44-6 ... 1293 LaPaloma, Memphis, approx. ... both Monroe, Woodruff and Prairie ... All in White River Levee Dist.

†**Connecticut**—U. S. Eng., ... Trust Bldg., Providence, R. I., ... Brook, Hartford Co., to ...



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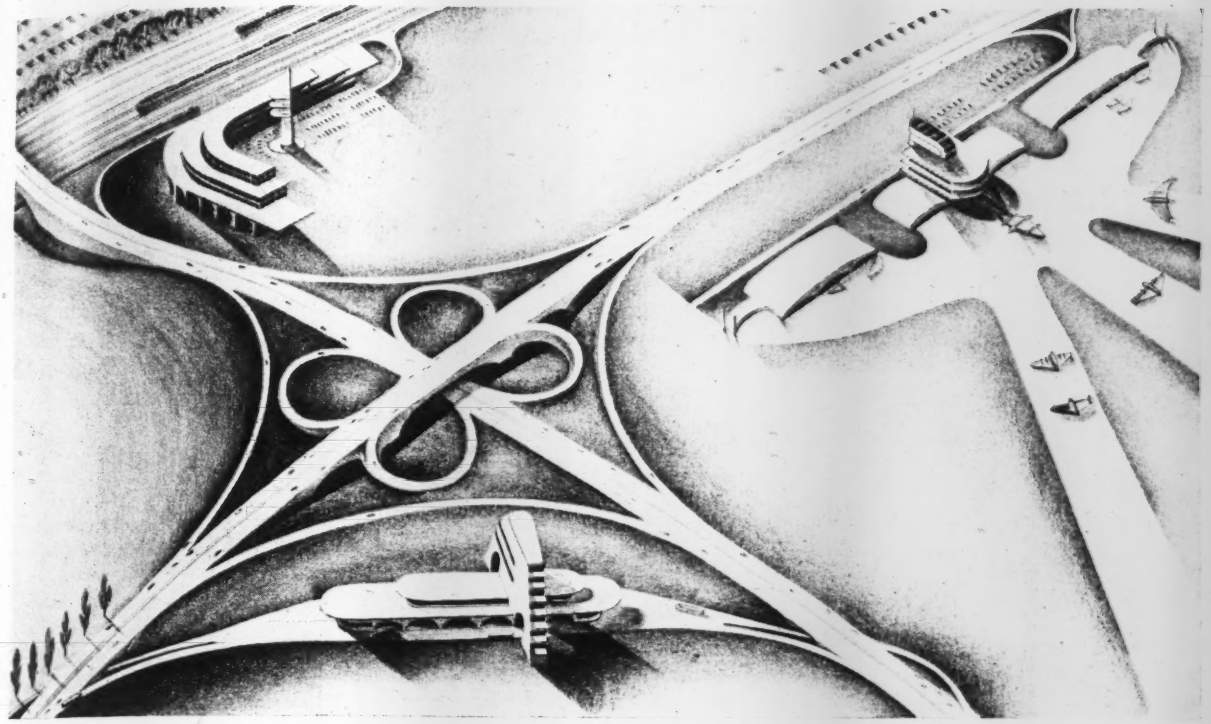

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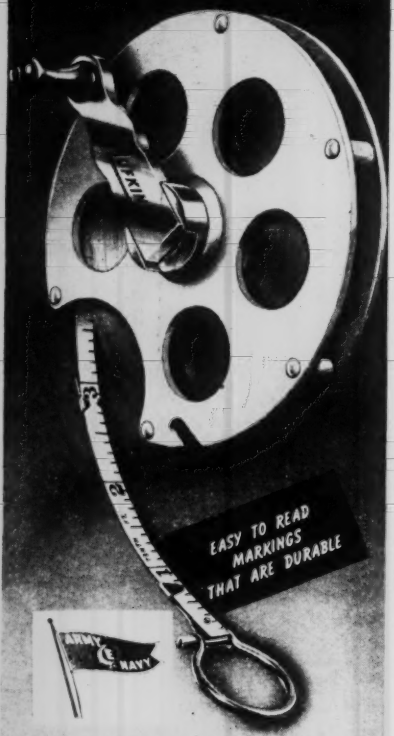

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EARTHWORKS (Contracts Awarded, Cont'd.)

Inc., 827 Remsen Ave., Brooklyn, N. Y., $400,000. Bids 7/30. CD 7/27.

†**Florida**—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, canal, Marion Co., to J. H. Craggs, Ocala, under $50,000. Awarded 6/29.

†**Georgia**—U. S. Eng., Post Office Bldg., Savannah, addnl. drainage facilities, Contr. 819-Eng-1622, Lowndes Co., to Coffee Constr. Co., Eastman, under $50,000.

†**Illinois**—U. S. Eng., 816 U. S. Courthouse & Customhouse, St. Louis 2, Mo., placing approx. 16,000 cu. yd. earth rebuilding levees, Neg. 1103-44-10, Scott Co., to Luhr Bros. Excavating Co., Columbia, under $50,000. Bids 7/27.

La., Abbeville—Bd. Comm. of Coulee Baton Gravity Drainage Dist. 1 of Vermillion Parish, dredging approx. 500,000 cu. yd. excav. on 36 mi. existing canals to J. P. Cross, 863 Oiga St., New Orleans, $52,350. CD 6/30—ENR 7/8.

†**New Hampshire**—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., rock removal, No. 44-3, Cheshire Co., to Lane Constr. Co., 37 Colony St., Meriden, Conn., $50,000-$100,000.

†**Ohio**—U. S. Eng., 925 New Federal Bldg., Pittsburgh, Pa., 6,000 ft. long, 40 ft. high Mosquito Creek Dam, Mahoning Co., for Mahoning Co. Conservancy Dist., Youngstown, to Dan D. Mullett Co., 4353 Murray Ave., Pittsburgh, Pa. Over $250,000. Bids 7/24, awarded 7/30.

Pa., Emporium—Penn. Commonwealth Dpt. Forest and Waters, J. E. Kell, secy., Harrisburg, dredging and disposition of approx. 278,000 cu. yd. Sinnemohoning Creek and West Creek, to D. B. Stabler, 600 N. 2nd St., Harrisburg, $111,200.

†**Texas**—U. S. Eng., 231 W. Main St., Denison, drainage, Contr. 257-Eng-2441, Hunt Co., to O. J. Parrott, 403 S. Haskell St., Dallas, under $50,000.

UNCLASSIFIED

PROPOSED WORK

Ark., Batesville—TRANSMISSION LINE—Arkansas Power & Light Co., Simmons National Bldg., Pine Bluff, transmission line across White River to Guion.

★**Mich., Detroit**—TRACKS, etc.—Dpt. Street Railways, Wm. S. Bullock, genl. mgr., St. Jean and Shoemaker Aves., reconstr. several miles tracks, repairing between tracks and intersections. $1,625,000.

Minn., Albert Lea—TRANSMISSION LINES—Freeborn-Mower Co-Operative Light and Power Assoc., transmission line connections $50,000.

★**New York**—AIRPORT DRAINAGE—Dpt. Marine & Aviation, Pier A, North River, New York, drainage at Idlewild Airport. $2,500,000.

N. C., Charlotte—PARK—Lions Club, F. Orr., chn. Park Com., 1st Natl. Bank Bldg., 60-100 acre park, swimming pool, stables, skating circle, lagoon, playgrounds, lake. Approx. $100,000.

†**Oklahoma**—IMPROVEMENTS—U. S. Eng., 416 Wright Bldg., Tulsa, cancelled contract, Imprvs., Sol. 957-Neg-44-5, Woodward Co. Project abandoned. CD 7/27—ENR 7/29, under CA.

†**Pa., Johnstown**—AIRPORT—City Clerk, City Hall, and Civil Aeronautics Admin., La Guardia Field, Jackson Heights, N. Y., airport imprvs.

Tex., Henderson—AIRPORT—Rusk Co., airport. $200,000.

BIDS ASKED

Bids Asked August 16

Ont., Kapuskasing—AERODROME—Acting Secy. Dpt. Transport, Ottawa, addnl. develop-

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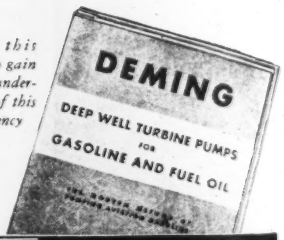

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UNCLASSIFIED (Bids Asked, Cont'd.)

ment of aerodrome, incl. paving, drainage, reconstructing hard surfaced areas. $75,000.

Bids Asked About August 20

†**N. M., Artesia** — AIRPORT — Civil Aeronautics Admin., P. O. Box 1689, Fort Worth, 1, Tex., airport. Plans deposit $20.

Bids Asked August 20

†**Tex., El Paso**—AIRPORT IMPROVEMENTS—Dpt. Commerce, Civil Aeronautics Admin., 514 Neil P. Anderson Bldg., Seventh and Lamar Sts., Fort Worth, airport imprvs., incl. clearing, grading, fencing, paving, conditioning and lighting, etc. Plans deposit $20. Extended date. CD 8/2—ENR 8/5.

Bids Asked About August 23

†**N. M., Hobbs** — IMPROVEMENTS — Civil Aeronautics Admin., P. O. Box 1689, Fort Worth, 1, Tex. airport imprvs. Plans deposit $20.

Bids Asked

†**Oklahoma**—STORAGE FACILITIES, etc.—U. S. Eng., 416 Wright Bldg., Tulsa, 2, storage facilities, etc., Sol. 957-Neg-44-23, Muskogee and Woodward Counties. Over $25,000.

LOW BIDDERS

†**Ariz., Nogales** — AIRPORT — Civil Aeronautics Admin., 1500 Fourth St., Santa Monica, airport, No. N 64-14, Santa Cruz Co., from P.D.O.C., Luhrs Bldg., Phoenix, **$385,330.** CD 7/15—ENR 7/22.

†**California**—IMPROVEMENTS—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, imprvs., roads, No. 127, Santa Barbara Co., from Bonadiman-McCain Co., 1709 W. 8 St., Los Angeles. Over **$50,000.**

Maryland — LANDSCAPING — State Rd. Comn., Baltimore, landscape work, seeding, mulching 7.492 mi. hy. along Hughesville-Mechanicsville Rd., Contr. CH 251-2, SM 251-2 and SM 252-2-566, Charles and St. Mary's Counties from Woodbine Nurseries, Inc., 614 Highwood Drive, Baltimore, **$28,500.** CD 7/16—ENR 7/22.

†**Nev., Fallon** — AIRPORT — Civil Aeronautics Admin., 1500 4 St., Santa Monica, Calif., July 30, addn. Freeman Field, from Dodge Constr. Co., Fallon, **$177,095.** CD 7/27—ENR 7/22.

Tex., Dacosta—OIL WELL—H. R. Cullen and H. J. Porter, Commerce Bldg., Houston, drilling, developing deep test oil well, from Rowan & Hope, Inc., Milam Bldg., San Antonio, approx. **$25,000.**

†**Tex., Sweetwater**—IMPROVEMENTS—Civil Aeronautics Admin., Neil P. Anderson Bldg., Fort Worth, August 3, imprvs., incl. lighting,

Build Better Runways

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Insure Substantial, Long-Lasting Concrete Runways and Aprons with

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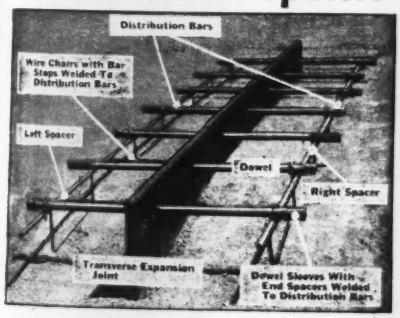
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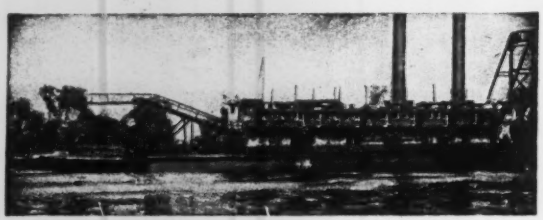

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CONTRACTS AWARDED

†Alabama—IMPROVEMENTS ... Grant St. west of Westwood ... imprvs., outside utilities, Inv. ... Co., to Harbert & Cargile Co., ... **$100,000.** Bids 7/17. $50,000.

†Arizona — IMPROVEMENTS ... 751 S. Figueroa St., Los Ang... imprvs., Yuma Co., to Basch ... Co., 600 S. Fremont Ave., Alha... under **$100,000.**

†Arizona—IMPROVEMENTS—U. S. Eng., 751 Figueroa St., Zone 14, Los An... No. 108 A, Yuma Co., to Tanner Constr. Co., P. O. Box 1832, Phoenix, under $50,000 awarded 7/27.

†Florida—DRAINAGE SYSTEM MODIFICATION—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, drainage system modification, Neg-Jax-43-1106, Polk Co., to J. E. Ballenger, Lakeland, under **$50,000.** Awarded 6/24.

†Florida — FACILITIES — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., lighter-than-air facilities, NOY 6927 to Cleary Bros. Constr. Co., Georgia Ave., West Palm Beach, **$82,550.**

†Florida — FACILITIES — U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, new facilities, Neg-Jax-44-47, Charlotte Co., to Paul Smith Constr. Co., 310 N. Rome Ave., Tampa, under **$500,000.**

†Florida—GRASSING—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, grassing, Duval Co., to J. O. Holmes, 2731 River Blvd., Jacksonville, under **$50,000.** Awarded 6/24.

†Florida—IMPROVEMENTS, etc.—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, imprvs., Neg-Jax-44-19, and grassing, both Clay Co. to B. B. McCormick & Sons, Graham Bldg., Jacksonville, under **$500,000** and **$50,000** respectively. Awarded 7/19 and 6/25 respectively.

†Florida—IMPROVEMENTS—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, imprvs., Neg-Jax-43-959, Hillsborough Co., to Brinson Constr. Co., Stovall Bldg., Tampa, under **$50,000.** Awarded 6/29.

†Florida—IMPROVEMENTS—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, imprvs., Neg-Jax-43-959, Hillsborough Co., to Wolfe Constr. Co., St. Augustine, under **$500,000.** Awarded 6/29.

†Florida—RANGES—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, ranges, Neg-Jax-43-1123, Highlands Co., to Stevens & Sipple, 1920 N. Orange Ave., Orlando, under **$50,000.** Awarded 6/24.

†Florida—RANGES—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, ranges, Orange Co., to American Constr. Co., Dunedin, under **$50,000.** Awarded 7/30.

†Florida—TENT FRAMES—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, tent frames, Orange Co., to J. L. Elwell, Lakeland, under **$50,000.** Awarded 7/5.

†Florida—TONEDOWN ORDNANCE AREA—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, tonedown ordnance area, Neg-Jax-43-1062, Lee Co., to Mike Blank Nursery, Delray Beach, under **$50,000.** Awarded 6/24.

†Florida—TONEDOWN ORDNANCE AREAS—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, tonedown ordnance areas, Neg-Jax-43-106, Pinellas Co., to J. W. Lynn, 110 W. Giddens Ave., Tampa, under **$50,000.** Awarded 6/30.

†Florida — TRAFFIC DEVELOPMENT — U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, traffic developing, Polk Co., to J. H. Craggs, and B. B. McCormick & Sons, Graham Bldg., Jacksonville, under **$50,000.** Awarded 6/17.

†Florida—TRAINING AIDS, etc.—U. S. Eng., Grant St. west of Westwood St., Mobile, Ala., training aids, transition firing range,

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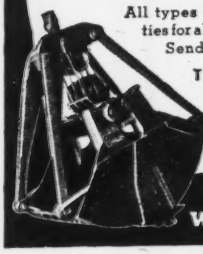

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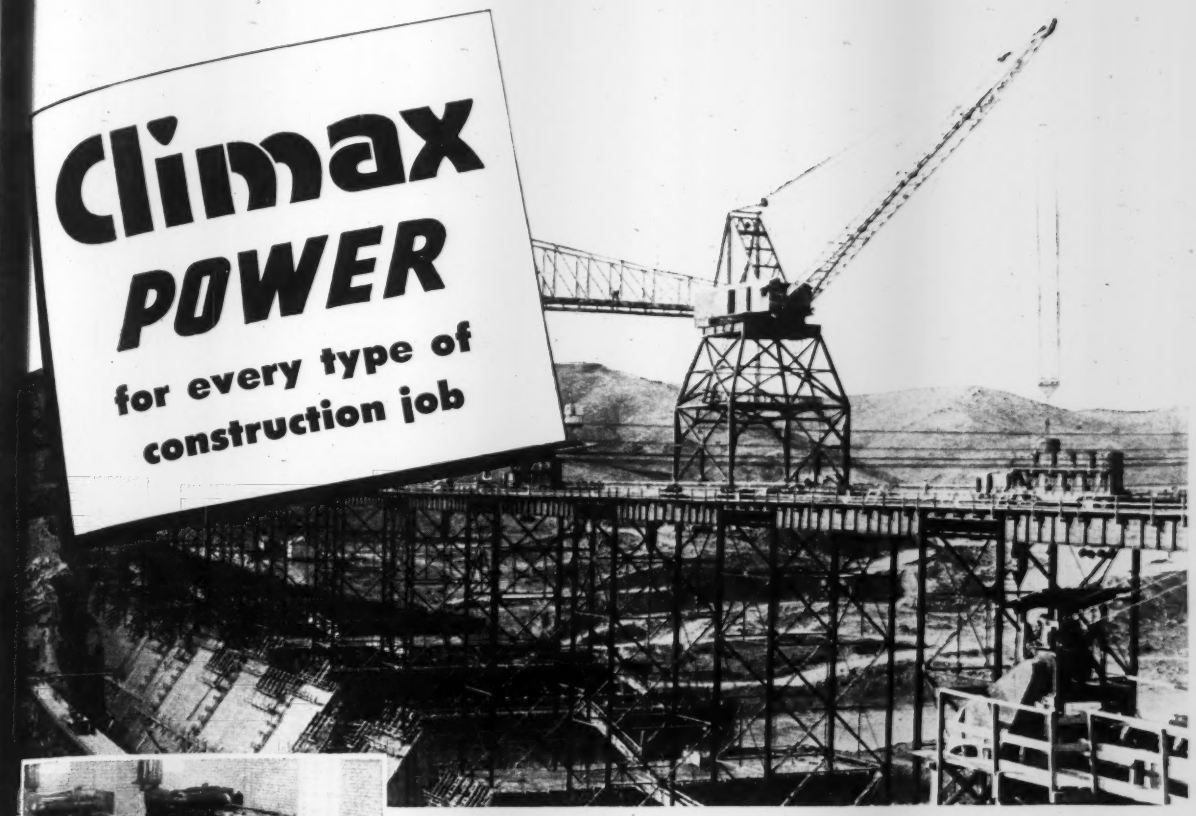
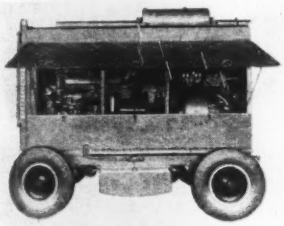


Photo above shows two Climax "Blue Streak" Engines used for municipal flood control. They are direct connected to vertical turbine pumps through right angle gears.



(Above) This fully enclosed portable Series Hm Set is used by a large eastern mining firm. It is powered by a 6-cylinder 200-hp. Hesselman engine. The generator is rated at 100 kw capacity.

ENGINES—Are 4-cylinder gas engines, 4, 6, 8 and 12-cylinder types, with ratings from 8 to 435 horsepower. Units are furnished complete for the job as specified.

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Have Ample Capacity of Mechanical or Electric Power—They deliver quick starting, unfailing power up to 435 horsepower and 312 kva.

Use Several Easy-to-get Fuels—Engines will operate on natural gas, butane, gasoline—whichever is easiest to obtain. Change-over can be accomplished in a short time.

Are Easy to Install, Easy to Operate—Their portability and ease of installation makes them a "natural" for fast moving war construction. Their simplicity and accessibility to parts enable a regular mechanic, without special training to maintain them.

Are Available for war construction or other high priority projects.

Get all the details today on how Climax can furnish an engine or generating set "tailored" to your specific requirements.

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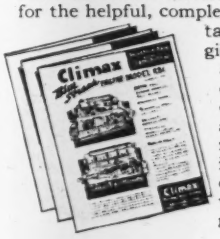

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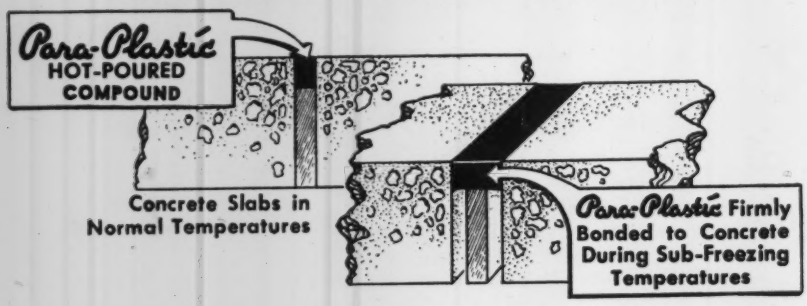

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UNCLASSIFIED (Contracts Awarded, Contd.)

Franklin Co., to Wright Contracting Co., First National Bank Bldg., Columbus, Ga., under $500,000.

†Florida—YARD—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, yard, Neg-Jax-44-48, Hillsborough Co., to Fred Howland, Inc., 1114 Postal Bldg., Miami, under $50,000.

†Florida—DRILLING—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, drilling, Neg-Jax-43-34, Marion Co., to Giles Drilling Corp., 18 E. 48 St., New York, N. Y., under $500,000. Awarded 7/27.

†Florida — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, addn. to electrical distr. sys., Neg-Jax-44-67, Charlotte Co., to Bigby Electric Co., 305 Franklin St., Tampa, under $50,000. Awarded 7/27.

†Florida — IMPROVEMENTS—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, paving parking aprons, Neg-Jax-44-61, Charlotte Co., to Brinson Constr. Co., 215 Madison St., Tampa, under $100,000. Awarded 7/30.

†Florida — IMPROVEMENTS — U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, imprvs., resurfacing taxiways, Neg-Jax-44-70, Hillsborough Co., to Brinson Constr. Co., 215 Madison St., Tampa, under $100,000. Awarded 7/28.

†Florida — OBSTACLES, etc. — U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, obstacles, roads, Neg-W.P.B.-44-1, St. Lucie Co., to Cleary Bros. Constr. Co., Georgia Ave., West Palm Beach, under $50,000. Awarded 7/28.

†Florida—SPRIGGING & SEEDING—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, sprigging and seeding, Neg-Jax-43780, Dade Co., to Calmay Nursey, 3401 N.W. 46 St., Miami, under $50,000. Awarded 4/1. (Correction—name of contractor). CD 5/7—ENR 5/13, under CA.

†Florida—TARGET RANGE—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, target range, Neg-Jax-44-70, Lee Co., to Southern States Constr. Co., Congress Bldg., Miami, under $50,000. Awarded 7/29.

†Florida—UTILITY YARD—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, utility yard, Neg-Jax-44-56, Lee Co., to E. T. Clarson, 101 Fifth St. S., St. Petersburgh, under $50,000. Awarded 7/22.

†Idaho—IMPROVEMENTS—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., completion of work, imprvs., NOY 7081, under 5449, to Morrison-Knudsen Co., Inc., 319 Bway., Boise.

★†Ia., Mason City—RUNWAYS—Civil Aeronautics Auth., 410 E. 12 St., Kansas City.

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NCLASSIFIED (Contracts Awarded, Cont'd.)

Mo., bituminous paving runways at airport, to A. T. Nolan Co. and McCree & Co., 18 N. 2 St., Minneapolis, Minn., $502,450. CD 7/15—ENR 7/22.

†Kansas—IMPROVEMENTS—U. S. Eng., Dierks Bldg., 1006 Grand Ave., Kansas City, Mo., imprvs., bldgs., Geary Co., to Casson & Constant, Manhattan, under $100,000.

†Mississippi—CLEARING—U. S. Eng., Grant St., w. of Westwood St., Mobile, Ala., clearing, grubbing, grading, Inv. 569-44-16, Lowndes Co., to S. R. Barson Constr. Co., Farley Bldg., Birmingham, Ala. Est. $50,000. CD 6/30—ENR 7/8.

Mont., Whitefish—RAILROAD YARDS—Great Northern Ry. Co., C. M. Nye, ch. engr., 175 E. 4 St., St. Paul, Minn., extending railroad yards, involving 600,000 cu. yd. fill, 9,200 ft. track, to A. Guthrie & Co., 424 Endicott-on-4th, St. Paul, Minn., $210,000.

†Nebraska—IMPROVEMENTS—U. S. Eng., 1709 Jackson St., Omaha, imprvs., bldgs., Clay Co., to Geer-Mauer Constr. Co., Grand Island, under $50,000.

†Nebraska—IMPROVEMENTS—U. S. Eng., 1709 Jackson St., Omaha, imprvs., bldgs., Fillmore Co., to Geer-Mauer Constr. Co., Grand Island, under $50,000.

†Nebraska—IMPROVEMENTS—U. S. Eng., 1709 Jackson St., Omaha, imprvs., bldgs., Hall Co., to Cooper Constr. Co., 4610 Douglas St., Omaha, under $50,000.

†Nebraska—IMPROVEMENTS—U. S. Eng., 1709 Jackson St., Omaha, imprvs., bldgs., Thayer Co., to Geer-Mauer Constr. Co., Grand Island, under $50,000. CD 7/20—ENR 7/22.

†New Jersey—MOTOR RAMPS—U. S. Eng., 120 Wall St., New York 5, N. Y., concrete motor ramps, Somerset Co., to W. Adams, 11 Central Ave., Tenafly, $50,000-$100,000.

†New York—CONSTRUCTION—U. S. Eng., 120 Wall St., New York, Zone 5, miscellaneous construction, Contr. 30-075-Eng-2, Nassau Co., to White Constr. Co., Inc., 95 Madison Ave., New York, $100,000-$500,000.

†North Carolina—IMPROVEMENTS—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., completion of portion of work, imprvs. NOY 7094, under NOY 4158, to Virginia Engineering Co., Newport News, Va.

★N. D., Grand Forks—AIRPORT—Civil Aeronautics Admin., 608 S. Dearborn St., Chicago, Ill., airport imprvs. to Butler Constr. Co., 911 N. 6 St., est. $530,375. CD 6/18—ENR 6/24.

N. D., Minot—GRADING and TRACK—Great Northern Ry. Co., C. M. Nye, ch. engr., 175 E. 4 St., St. Paul, Minn., 6 mi. grading to Megarry Brothers, St. Cloud, Minn., $27,000. Track laying by own forces. Total est. $185,000.

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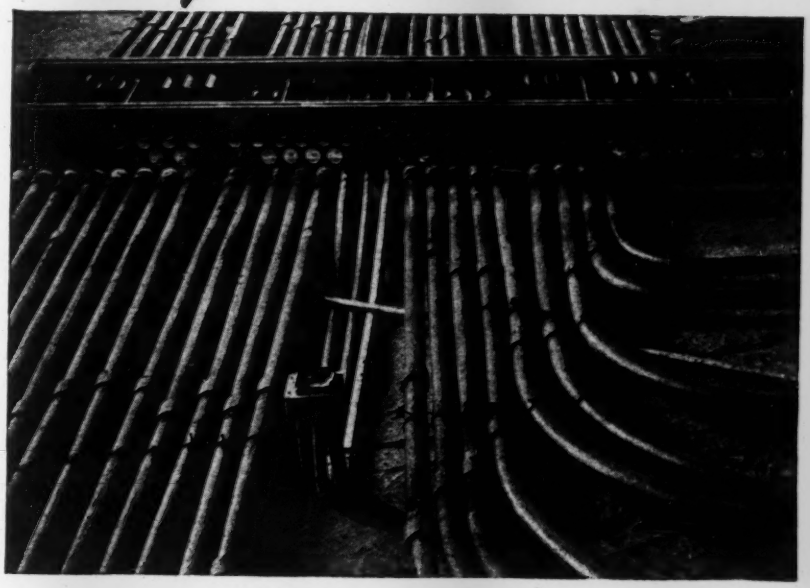

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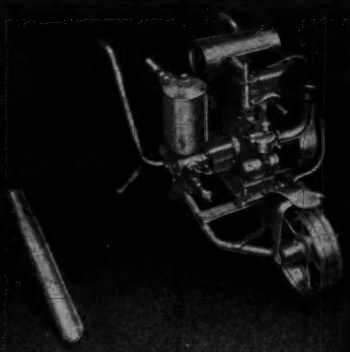

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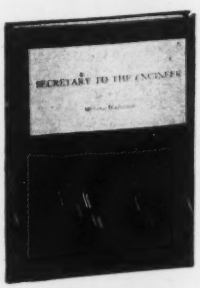

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Company .....NR. 8-12-43

UNCLASSIFIED (Contracts Awarded, Cont'd.)

†Ohio—FIRE ALARM SYSTEM—U. S. Eng. 925 New Federal Bldg., Pittsburgh, Pa. fire alarm sys., Contr. 1101-Eng-5677, Cuyahoga Co., to Gamewell Co., Park Ave., Pittsburgh, Pa., under **$50,000.**

†Oregon — FENCE — U. S. Eng., Pittock Block, Portland, fence, Multnomah Co., to Cyclone Fence Co., 400 N. 11 Ave., Portland, under **$50,000.**

†South Dakota — IMPROVEMENTS — U. S. Eng., 1709 Jackson St., Omaha, Neb., imprvs., bituminous road surfacing, Davison Co., to Megarry Bros., St. Cloud, Minn., under **$50,000.**

†South Dakota — IMPROVEMENTS — U. S. Eng., 1709 Jackson St., Omaha, Neb., imprvs., bituminous road surfacing, Hughes Co., to Jay W. Craig Co., 1814 N. California St., Minneapolis, Minn., under **$50,000.**

†South Dakota—IMPROVEMENTS—U. S. Eng., Administration Bldg., Fort Peck, Mont., imprvs., bldg., Pennington Co., to H. H. Hackett, Rapid City, under **$50,000.**

†Texas — SWIMMING POOLS — Aviation Cadet Center, 6 swimming pools, Bexar Co., to Paddock Engineering Co., Texas, 900 S. Savoy St., Dallas. Est. **$90,000.**

†Texas — WATER TARGETS, etc.—U. S. Eng., 25 St. and Ave. F, Galveston, water targets and access waterway, Sol. 359-44-C2, Galveston Co., to Bauer-Smith Dredging Co., Pt. Lacava, under **$50,000.** CD 7/27—ENR 7/29. Under WW.

Washington—DOCK REPAIRS—State Hy. Dpt., Olympia, reconstructing cradle and dolphins, repairing dock at Sixth Ave. ferry terminal and placing new stringers and deck on portion of dock of Point Fosdick terminal, to Hart Constr. Co., 3535 E. 11 St., Tacoma, **$35,416.** B. Bantz, state hy. dir. Bids 7/20. CD 7/15.

†Washington — CONSTRUCTION — U. S. Eng., 800 3 Ave., Seattle 4, addnl. construction, Grant Co. to Woodworth & Co. and Macdonald Bldg. Co., Moses Lake, under **$50,000.**

†Washington—ELECTRIC SYSTEM—U. S. Eng., 800 3 Ave., Seattle 4, electric sys., King Co., to J. M. Hooper Electric Co., 222 Marion St., Seattle 4, under **$50,000.**

†Wisconsin—FACILITIES—U. S. Eng., 520 Merchandise Mart, Chicago, Ill., addnl. facilities, Contr. 11-032-Eng-507, Monroe Co., to Paul Steenberg Co., W-1757 1st Natl. Bank Bldg., St. Paul, Minn., **$50,000-$100,000.**

†Wyoming—IMPROVEMENTS—U. S. Eng., 1709 Jackson St., Omaha, Neb., imprvs., bldgs., Natrona Co., to Green Bros. & Co., Cheyenne, under **$50,000.**

†Wyoming—IMPROVEMENTS—U. S. Eng., 1709 Jackson St., Omaha, Neb., imprvs., bldgs., Natrona Co., to L. D. Liesinger, Casper, under **$50,000.**

PUBLIC BUILDINGS

PROPOSED WORK

†Alabama—Pub. Housing Auth., Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., 100 dwelling units, Ala. 1208. CD 6/16—ENR 6/24.

†California—Pub. Housing Auth., NHA, 785 Market St., San Francisco, 50 trailer park, Calif. 4750, Riverside Co.

†California—Pub. Housing Auth., NHA, 785 Market St., San Francisco, 75 trailer park, Calif. 4752, Los Angeles Co.

†California—U. S. Eng., 74 New Montgomery St., San Francisco, bldg., Job No. 973, central California.

†California—U. S. Eng., 74 New Montgomery St., San Francisco, bldgs., Job No. 1103, central California.

†Calif., Los Angeles—Home Owners' Loan Corp., Pacific Bldg., San Francisco, 1,500 family unit conversion program.

†Calif., Richmond—Pub. Housing Auth., NHA, 785 Market St., San Francisco, 3000

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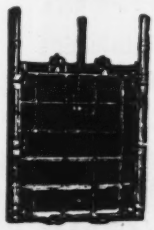

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PUBLIC BLDGS. (Proposed Work, Cont'd.)

family dwelling units, Cal. 4751.

†**Calif., Stockton**—Home Owners' Loan Corp., Pacific Bldg., San Francisco, 18 family unit conversion program.

†**Colo., Colorado Springs**—Home Owners' Loan Corp., Woodmen of the World Bldg., Omaha, Neb., 300 unit conversion program.

†**D. C., Wash.**—Federal Works Agency, 18 and F Sts. N.W., Wash., Zone 25, recreation facilities bldg. for service men, near Union Station, for Recreation Services, Inc. $225,000 allot.

†**Fla., Panama City**—Pub. Bldg. Admin., 18 and F Sts., Wash., 25, D. C., 22 classroom elementary school, N. E. corner of Michigan and Magnolia Sts., Fla. 8-268.

†**Ga., Marietta**—Bd. Educ., City Hall, school. Docket Ga. 9-253. Est. $154,440.

†**Idaho, Bayview**—Bayview Common School Dist. No. 34, Kootenai County, school facilities. Idaho 10-197. Est. $101,850. FWA.

†**Illinois**—Pub. Housing Auth., NHA, 201 N. Wells St., Chicago, plans by Shaw, Naess & Murphy, 80 E. Jackson Blvd., Chicago, 1,500 unit housing, landscaping, sidewalks, paving, sewers, light distr. sys., etc. Ill. 2-7. CD 7/19—ENR 7/22.

†**Ind., South Bend**—Pub. Housing Auth., NHA, 201 N. Wells St., Chicago, Ill., 100 family trailer or portable unit housing, Ind. 12176.

†**Md., Riverdale**—Pub. Housing Auth., NHA, Temporary Bldg. No. 2, 19 and D Sts. N.W., Wash., D. C., school. $41,500. FWA funds allotted.

†**Michigan**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, O., plans by W. Kapp, 720 Buhl Bldg., Detroit, community bldg. and day care bldg. for Housing, Mich. 20088.

★**Mich., Detroit**—Pub. Lighting Comn., F. M. Hally, secy., 174 Atwater St., extend. electric power plant.

†**Neb., Hastings**—Federal Works Agency, 18 and F Sts., Wash. 25, D. C., school. $233,645.

†**Nevada**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, Calif., plans by DeLongchamps & O'Brien, Phelan Bldg., San Francisco, dormitory units, Nev. 26155. CD 7/28—ENR 8/5.

†**New Jersey**—Brewster Aeronautical Corp., 24-01 38 Ave., Long Island City, N. Y., plans by McLaughlin Assoc., 80 W. 40 St., New York, N. Y., cafeteria bldg. $90,000. Federally financed.

†**New Jersey**—N. J. Shipbuilding Corp., 1200 State St., Perth Amboy, 1 story, frame, concrete cafeteria and locker bldg., installation electrical supply sys. Federally financed.

†**Ohio**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, plans by Triangle Associates, 500 Dominion Bldg., Lima, 140 unit temporary family dwellings, Ohio 33721.

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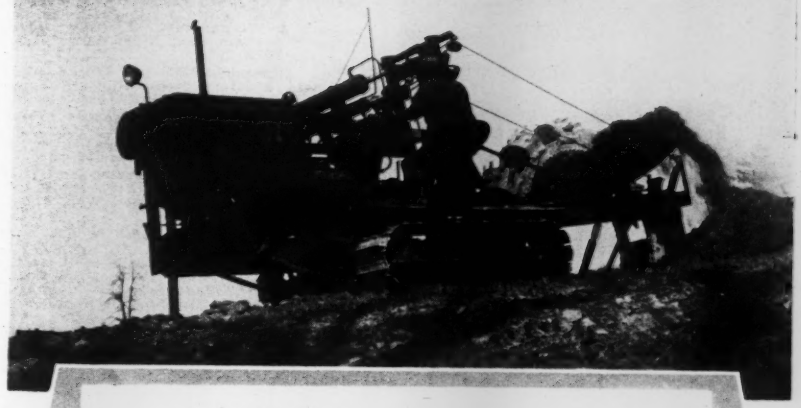

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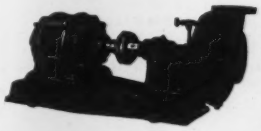

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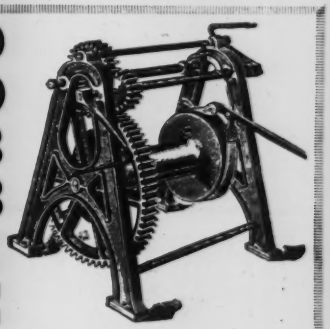

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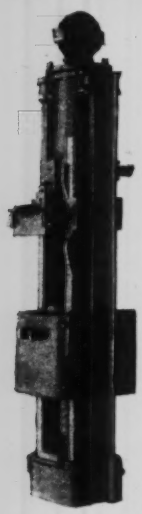

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PUBLIC BLDGS. (Proposed Work, Cont'd.)

†**Ohio**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, plans by Triangle Associates 4614 Prospect Ave., Cleveland, 500 unit temporary family dwellings, Ohio 33266. CD 6/23—ENR 7/1 .

†**Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York 7, N. Y., plans by W. H. Lee, Schaff Bldg., 1505 Race St., Phila., 160 unit dwellings, Pa. 36437. CD 7/27—ENR 7/29.

★†**S. D., Sioux Falls**—Veterans Admin., Vermont Ave., between H and I Sts. N.W., Wash., D. C., hospital. Probably over $3,000,000. CD 5/20—ENR 5/27.

†**Texas**—Pub. Housing Auth., NHA, 1205 Electric Bldg., 7th and Taylor Sts., Fort Worth, plans by Stone & Pitts, Salisbury, McGinty & Werlin, 2017 W. Gray, Houston, dormitory shelters, Tex. 41-594. Over $150,000. CD 7/15—ENR 7/22.

†**Va., Alexandria**—Federal Works Agency, 601 State Planters Bank Bldg., Richmond, school, Va. 44313, for State. $100,000.

†**Wash., Vancouver** — Vancouver Housing Auth., Administration Bldg., McLoughlin Heights, plans by R. Sundeleaf, Fenton Bldg., Portland, Ore., school addns. $275,000.

†**Wyo., Superior**—Pub. Housing Auth., NHA, Dierks Bldg., 1006 Grand Ave., Kansas City, Mo., 30 family dwelling units, Wyo. 48083.

BIDS ASKED

Bids Asked August 16

†**Maine**—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., 216 unit dormitory housing, Me. 17078. Plans deposit $50 first set and $10 each addnl. set. Wadsworth & Boston, 57 Exchange St., Portland, archts. CD 7/29—ENR 8/5.

†**Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York 7, N. Y., 440 unit family dwellings, Pa. 36436. Plans deposit $50. CD 8/4—ENR 7/22.

Bids Asked After August 16

†**Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York 7, N. Y., shingling walls, Pa. 36031. Plans deposit $10. C. Wagner, 133 W. 4 St., Williamsport, archt.

Bids Asked August 17

†**California**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, rejected bids, 30 family dwelling units, community bldgs., Calif. 4716. C. F. Gromme, Alberts Bldg., San Rafael, archt. CD 7/13—ENR 7/15.

†**South Carolina**—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., 40 unit housing, SC-38030. A. E. Constantine, Calhoun St., Charleston, archt. CD 7/28—ENR 8/5.

Bids Asked After August 19

†**Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York 7, N. Y., commercial facilities, site imprvs., Pa. 36131. Plans deposit $25. Button, Sterling & McLean, 119 E. Montgomery St., Pittsburgh, archts. CD 7/28—ENR 8/5.

†**Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York 7, N. Y., commercial bldg., Pa. 36281. Plans deposit $10.

Bids Asked August 20

†**Florida**—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., commercial facilities, Fla. 8104. Yonge & Hart, Theisen Bldg., Pensacola, archts.

†**Ohio**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, 200 temporary family dwelling units, Ohio 33265. Plans deposit $50. Extended date. Britsch & Munger, Nicholas Bldg., Toledo, archts. CD 7/26—ENR 7/29, under BA.

†**Washington**—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., Seattle 1, 80 unit housing, Wash. 45223, and 36 unit dormitory housing, Wash. 45224. J. W. Maloney, Larson Bldg., Yakima, archt. CD 7/21—ENR 7/29.

Bids Asked After August 20

†**Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York 7, N. Y., tenant activity bldg., child care center. Plans deposit $25. CD 7/15—ENR 7/22.

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BLIC BLDGS. (Bids Asked, Cont'd.)

Bids Asked August 21

Nebraska—Pub. Housing Auth., NHA, rks Bldg., 1005 Grand Ave., Kansas City, . community budgs. Fisher & Fisher, nver Natl. Bank Bldg., Denver, Colo., grs. and archts. CD 6/29—ENR 7/8.

Bids Asked After August 21

New York—Pub. Housing Auth., NHA, 270 dway., New York, Zone 7, community bldg., ild service bldg., sidewalks, NY-30033. ans deposit $25. Hudson & Frontzak, 804 nd Bldg., Buffalo, archts.

Bids Asked August 23

Maryland—Pub. Housing Auth., NHA, Tem- rary Bldg., No. 2, 19 and D. Sts., N.W., ash. D. C., dormitory units, Md. 18266; mily dwelling units, Md. 18267; dormitory its, Md. 18268; family dwelling units, Md. 269. F. L. W. Moehle, 312 Professional dg., Baltimore, archt. CD 7/8—ENR 7/15.

Wash., Seattle—Port of Seattle, Bell St. Terminal, Zone 1, two 1 story, 110x980 transit sheds. $700,000. Plans deposit 00. CD 7/26—ENR 7/29.

Bids Asked August 24

Ky., Louisville—W. P. Hogarty, dir., Div. urchases and Pub. Properties, 230 New State ffice Bldg., Frankfort, hospital, Hazelwood anitorium. Plans deposit $50. P. S. Sinton, 0 New State Office Bldg., Frankfort, actg. engr. ENR 2/4.

N. J., Skillman—State Bureau Institutions Agencies, West Hanover St., Trenton, addn. ousing, State Village for Epileptics. Plans eposit $25, over $150,000. CD 10/20/42—NR 10/29/42.

N. J., Vineland—State Bureau Institution & gencies, West Hanover St., Trenton, addn. ousing, State School. Plans deposit $25, ver $300,000. CD 10/27/42—ENR 10/29/42.

Bids Asked After August 24

Pennsylvania—Pub. Housing Auth., NHA, 70 Bway., New York 7, N. Y., community nal administration bldg., Pa. 36041. Plans eposit $10.

Bids Asked After August 25

New York—Pub. Housing Auth., NHA, 270 dway., New York, Zone 7, 160 family dwell- ngs, NY-30170. Plans deposit $50. Extended ate. CD 7/28—ENR 8/5.

Bids Asked Early September

Conn., Hartford—Hartford Architectural Bureau, 550 Main St., rein.-con, steel, isola- ion unit hospital addn., Holcomb St., Conn. -194. FWA. Ebbets & Frid, 15 Lewis St., rchts., $303,994. CD 6/21—ENR 6/24.

Bids Asked About September 2

N. Y., Garden City—Pub. Bldgs. Admin., E and F Sts. N.W., Wash. 25, D. C., school r nursing dormitory at Adelphi College. WA. McKim, Mead & White, 101 Park ve., New York, archts. CD 5/12—ENR 5/20.

Bids Asked September 2

Wis., Beloit—City, A. D. Kelfer, mgr., hos- ital addn. P. W. Severn & Assoc., 19 S. La alle St., Chicago, Ill., archts.

Bids Asked September 15

Virginia—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., family dwelling nits, Va. 44297 and 44298. CD 7/28.

Bids Asked September 21

Calif., Los Angeles—Veterans Admin., Ver- ont St., between H and I Sts. N.W., Wash., D. C., relocating chapel bldg., No. 20.

Bids Asked

Massachusetts—U. S. Eng., 31 St. James ve., Boston (selected list bidders), tem- orary bldgs., 19-023-44—NEG-18.

Massachusetts—U. S. Eng., 31 St. James ve., Boston, (selected list bidders), tempo- ary bldgs., 19-023-44-Neg 20, Barnstable Co.

Tex., College Station—A & M College of Texas, c/o Cotton Research Comm., cotton il mill plant bldg., P. G. Norton, c/o College, rcht.

Va., Arlington—Arlington Co., Arlington,

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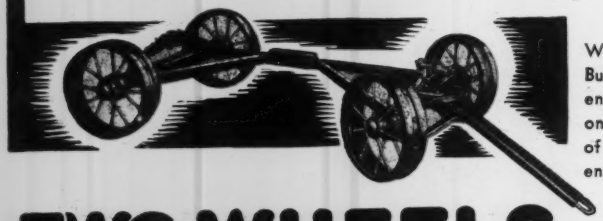

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PUBLIC BLDGS. (Bids Rejd. Contd.)

high school, Va. 44-21 $279,000. FWA State Div. School Bldgs. State Office Bldg., Richmond, archts. CD 7/28—ENR 4/29.

LOW BIDDERS

★**†Oregon**—Pub. Housing Auth., NHA, Sanner Bldg., 5 Ave. and Jackson St., Seattle, 1, Wash., Aug. 3, housing from Halverson Constr. Co., Salem, $194,200. CD 7/28—ENR 8/5.

★**†Virginia**—U. S. Eng., Port Norfolk, Norfolk, Duffield Co., from Doyle & Russell, Central Nat. Bank Bldg., Richmond. Est. Approx. $5,000,000. CD 7/27—ENR 7/1.

CONTRACTS AWARDED

†Alabama—U. S. Eng., Grant St. west of Westwood St., Mobile, addn. cold storage facilities, Mobile Co., to S. W. Newman, Merchants National Bank Bldg., Mobile, $50,000. Bids 7/29.

★**†California**—U. S. Maritime Comm., Financial Center Bldg., Oakland, sixteen 1 story dormitory bldgs., recreation bldg., Contra Costa Co., to E. A. Kaiser Co., Richmond War Terrace Post Office, Est. over $500,000. Engrg. Dpt., H. J. Kaiser Co., Richmond Shipyard No. 4, archts.

†California—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, bldg. repairs, utilities, roads, No. 122, San Bernardino Co., to J. N. Robinson, 611 Base Line Ave., San Bernardino, under $50,000. Awarded 8/2

†California—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, bldgs., No. 306C, Riverside Co., to Scherer & Prichard, 2054 Orange St., Redlands, under $50,000.

†California—U. S. Eng., 74 New Montgomery St., San Francisco, addnl. housing, Spec. 939-A and 1061, San Francisco Co., to Howell Engineering Corp., Kohl Bldg., San Francisco. Awarded 8/2. CD 7/30—ENR 8/5.

†California—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., bldgs., NOY 6667, to K. E. Parker Co., 122 S. Park St., San Francisco, $85,000.

†California—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., bldgs., NOY 3089, to I. C. Curry & F. S. Young, 1701 B St., San Diego.

†Conn., Bridgeport—Bridgeport Hospital, Grant St. and Central Ave., electrical work for hospital addn., Mill Hill Ave., Grant St., Conn. 6-140, to G. A. Johnson, 3495 Park Ave.. CD 7/29—ENR 8/5, under CA.

†Delaware—U. S. Eng., 6th and Walnut Sts., Phila., Pa., frame bldgs., New Castle Co. to F. H. Wilson, Colonial Bldg., Ardmore, Pa., $100,000-$500,000. Awarded 8/2.

†Florida—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, bldgs., Neg-Jax-43-1199, Duval Co., to A. L. Clayton, Inc., 227 W. Forsythe St., Jacksonville, under $50,000. Awarded 6/29.

†Florida—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, bldg. addn., Neg-Jax-43-1166, Pinellas Co., to Edward S. Moore & Sons, 307 First Ave. S., St. Petersburg, under $50,000. Awarded 6/26.

†Florida—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, plant addn., Neg-Jax-43-571, Volusia Co., to Murphy Constr. Co., Clare Ave., West Palm Beach, under $50,000. Awarded 6/26.

†Florida—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., magazines, Fleming Key, NOY 6492, to The Mackle Co., 2818 Coral Way, Miami, $50,876.

†Kansas—Pub. Housing Auth., NHA, Dierks Bldg., 1006 Grand Ave., Kansas City, Mo., community bldg., child care bldg., commercial and school bldgs., to S. Patti Const. Co., 1114 Bway., Kansas City, Mo., $188,923. Bids 7/26. CD 7/20—ENR 7/22.

†Maine—U. S. Eng., 31 St. James Ave., Boston, Mass., temporary bldgs., 19-023-44-NEG-9, Aroostook Co., to T. W. Cunningham, Inc., 15 State St., Bangor, $100,000-$500,000. Bids 7/30.

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Washington, D. C.

PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

†**Montana**—U. S. Eng., 800 3 Ave., Seattle, Wash., temporary frame bldgs., Contr. 869-Eng-10436, Cascade Co., to Dudley-Anderson Co., 900 25 St., N., Great Falls, **$100,000-$200,000.**

†**Oklahoma**—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, addnl. facilities "B", bldgs., concrete paving, etc., Sol. 957-Neg-44-17, Oklahoma Co., to Stephens-Brown Co. BMA Bldg., Kansas City, Mo., **$50,000-$100,000.**

†**Nebraska**—Pub. Housing Auth., NHA, Dierks Bldg., 1006 Grand Ave., Kansas City, Mo., housing, Neb. 25065 and 25066, to Paul Steenburg Constr. Co., W1757 First Natl. Bank Bldg., St. Paul, Minn. Approx. **$700,000.** Bids 7/23. CD 8/2—ENR 8/5 under LB.

†**Nevada**—U. S. Eng., 1209 8 St., Sacramento 8, addnl. housing, reclamation yard, etc., Nye Co., to G. E. Hall, 1326 30 St., Bakersfield, Calif., **$100,000-$500,000.**

†**New Jersey**—U. S. Eng., 120 Wall St., New York, 5, N. Y., housing, Hudson Co. to Daniel J. Cronin, Inc., 717 S. Orange Ave., Newark, **$500,000-$1,000,000.** Bids 7/22. CD 7/16.

†**Oklahoma**—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, addnl. facilities, incl. bldgs., driveway, walks, paving, gas stand-by sys., water, sewer, gas, electrical lighting facilities, etc., Sol. 957-Neg-44-11, Tulsa Co., to Tulsa Rig & Reel Mfg. Co., and American Reel Derrick, 1007 Philtower Bldg., Tulsa, **$100,000-$500,000.**

†**Oklahoma**—U. S. Eng., 416 Wright Bldg., Tulsa, 2, rein-con., founds. for bldgs., Tulsa Co., to Manhattan Const. Co. of Okla., Muskogee, **$50,000-$100,000.**

†**Oklahoma**—U. S. Eng., 231 W. Main St., Denison, Tex., addn. bldgs., facilities, Contr. 957-Neg-2412, Carter Co., to J. T. Chapman & Sons, Sulphur, under **$50,000.**

†**Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York, 7, N. Y., housing Pa. 36429 to Fred J. Brotherton, Inc., 185 Atlantic St., Hackensack, N. J., **$590,728.** Bids 7/29. CD 8/2—ENR 8/5 under LB.

†**Oregon**—Swan Island Shipbuilding Co., Swan Island, Portland, warehouse, to Ralph A. Horwitz, 1835 N. Flint St., Portland, **$200,000.** Federally financed. Wolff & Phillips, Pearson Bldg., Portland, archts. Awarded July 28.

Utah—U. S. Eng., 32 Exchange Pl., Salt Lake City, heating installations, bldgs., Weber Co., to Scott Co., Hotel Utah, Salt Lake City. Est. **$110,000.**

†**Utah**—U. S. Eng., 32 Exchange Pl., Salt Lake City, altering bldgs., Weber Co., to F. J. Twaits, Newhouse Bldg., Salt Lake City. Approx. **$200,000.** Bids 7/24.

†**Utah**—Pub. Housing Auth., NHA, Dierks Bldg., 1006 Grand Ave., Kansas City, Mo.,

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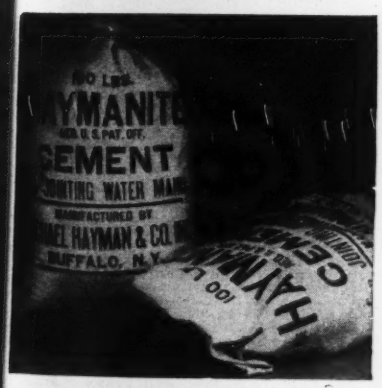

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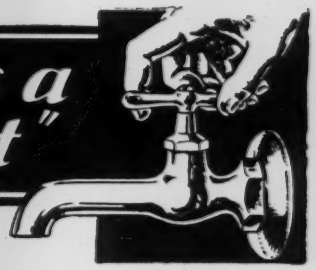

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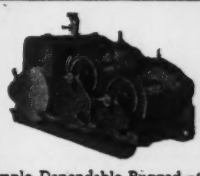

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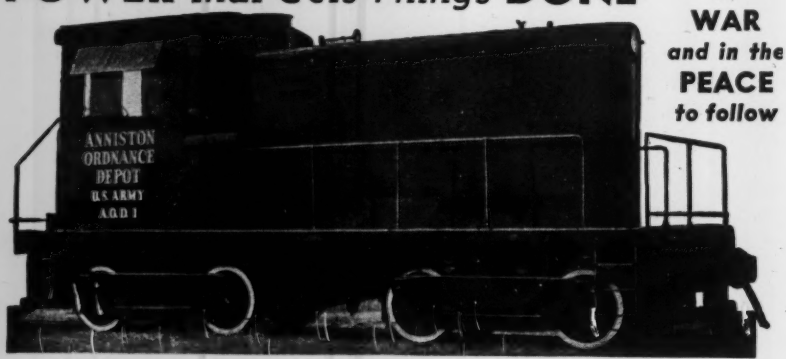

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COMMERCIAL BUILDINGS

PROPOSED WORK

†**Mont., Great Falls**—Hom... Owners Loan Corp., Pacific Bldg., San Francisco, Calif., 2... family unit building conversions.

N. J., Rahway—L. Greenbaum, 225 W. 34 St., New York, N. Y., plans by R. H. Bowden, 15 E. 40 St., New York, N. ... 2 and 3 story bsmnt., brick apartments, 280 suites, $600,000.

O., Cleveland—Wm. Bauer, 608 Bolivar Rd., plans by J. Boenisch, 750 Prospect Ave., 2 story, brick apartment, $150,000.

Pa., Devault—Beaver Housing Corp., 219 N. Broad St., Phila., soon lets contract 40 houses, at Devault, Charlestown Twp., near Malvern. R. R. Neely, Fuller Bldg., Phila., archt.

Tex., Goose Creek—Bay Builders, Inc., 2... McClendon, Houston, 25 dwellings, $150,000.

Tex., Houston—Lawndale Terrace Corp., W. G. Farrington, 1719 Sunset Blvd., eleven 2 story solid masonry apartment bldgs., $249,975.

Tex., Pasadena—Whitworth Corp., plans by McGinty & Knostman, 2017 W. Gray, Houston, 5 and 6 room dwellings, incl. utilities, etc., $150,000.

Tex., Pasadena—Whitworth Corp., plans by McGinty & Knostman, 2017 W. Gray, Houston, 18 duplex apartment bldgs., facilities, etc., concrete slab fdns., tile floors, etc., $150,000.

Tex., San Antonio—American Legion, 1666 K St. N.W., Wash., D. C., and A. G. Uhlichman., Bexar Co. Legion, general medical and surgical hospital.

Tex., San Antonio—Broadfells, Inc., 412 Natalen, twenty or more, 2 story, duplex homes, utilities, etc., $150,000.

BIDS ASKED

Bids Asked August 18

O., Cleveland Heights (mail Cleveland)—Quilliams-Noble Co., M. Levan, 200 Engineers Bldg., Cleveland, two 3 story, bsmnt., brick apartments, $250,000. Jos. A. Gattozzi, 2000 W. 25 St., Cleveland, archt. CD 7/16—ENR 7/22.

Bids Asked

La., New Orleans—Treasure Realty Co., 403 Carondelet St., 100 two family apt. bldgs. Over $150,000.

Pa., Pittsburgh—Rosella Foundling & Maternity Hospital, H. E. Devlin, ch. Bd., 1612 Cliff St., 1 story, 24x32 ft., concrete block boiler house for hospital, L. A. McMullin, 904 Renshaw Bldg., archt.

CONTRACTS AWARDED

Calif., Long Beach—Canoga Investment Co., 417 S. Hill St., Los Angeles, forty-one 6 room dwellings, frame, stucco. Owner builds, $161,950. Wm. E. Ladwick, Union League Bldg., Los Angeles, engr.

Conn., Hartford—Trinity College, Summit St., 170x185 ft. brick laminated wood field house, Broad Street Sect., to A. F. Peasley, Inc., 15 Lewis St., Hartford. Est. $150,000. McKim Mead & White, 101 Park Ave., New York, N. Y., archts.

Conn., Southington—Junard Constr. Co., R. J. Lacy, 5 Center St., thirty-five, 5 room, 24x30 ft., frame homes, Berlin St. Owner builds, $150,000. E. C. Bradley, 302 Union Ave., West Haven, archt.

Me., Brunswick—Brunswick Apartments, Inc., 66 Main St. Waterville, housing, 90 apartments, Main St. and Longfellow Ave., to C. S. Patten, 68 Essex St., Melrose, Mass., est. $400,000. Hutchins & French, 11 Beacon St., Boston, Mass., archt.

Me., Presque Isle—Cumberland Corp., c/o Hamilton Shields, Highland Ave., Portland, 2 story, brick veneer, frame garden type apartments. Owner builds. $175,000. Hutchins & French, 11 Beacon St., Boston, Mass., archts.

Mo., St. Louis—The Forsythe Corp., 8015 Forsythe Blvd., Clayton, Zone 5, thirty-seven 2 story, 24x36 ft., brick bungalows to Berkley Constr. Co., 8015 Forsythe Blvd., Clayton, Zone 5, about $180,000. R. Gueninger, 8015 Forsythe Blvd., Clayton, Zone 5, archt.

N. J., Caldwell—Eumsey Park, Inc., 46 Ridge Rd., North Arlington electrical work for 2 story, brick, veneer, frame garden apartments, Bloomfield Ave., and Prospect St., to Busch Bros., 101 W. Palisade Ave., Englewood. CD 6/22—ENR 6/24 under CA.

N. J., Orange—Owner, c/o McMurray & Schmidlin, archts., 968 Stuyvesant Ave., Union, 40 family housing units, Tremont Ave., to H. Kiep, 8 Elm St., Westfield, $175,000.

O., Berea—Town House, Inc., S. Galvin, 1338 Guardian Bldg., Cleveland, two 3 story bsmnt., 25x104 ft., apartments, to G. S. Gundling, Guardian Bldg., Cleveland. Total est. $200,000. Bids 6/26. CD 6/23—ENR 7/8.

O., Cleveland—Riverside Apartments, S. Galvin, 1338 Guardian Bldg., two 3 story bsmnt. apartments, to G. S. Gundling, Guardian Bldg. Est. $225,000. Garfield, Harris Robinson & Schafer, National Bldg., archts.

MMERCIAL BLDGS. (Contracts Awarded, Cont'd.)

Pa., Versailles Twp.—Walter Furer, RD 1, reatum and N. F. Daugherty, (chg.) 979 ston Trust Bldg., Pittsburgh, forty, 2 story, mst., 22x32 ft., brick on tile, residences. parate contracts, $250,000.

INDUSTRIAL BUILDINGS

OPOSED WORK

Ark., Ozark—PLANT—Ozark Canning Co., rebuild canning plant, $500,000.

Conn., Terryville—PLANT—S. F. Bowser & Inc., R. H. Daman, Fort Wayne, Ind., nt imprvs., $200,000.

Ill., Harvey — FACTORY — Whiting Corp., ans by Burnham & Hammond, 160 N. La-lle St., Chicago, factory addn., $100,000.

Ia., Cherokee—PLANT—Farmers Produce plans by Wm. Beuttler, Insurance Ex-hange Bldg., Sioux City, poultry processing nt. $40,000.

Minn., Alexandria—SKIM-MILK SPRAY TING PLANT—Land O' Lakes Dairy Co., 2301 N.E. Kennedy St., Minneapolis, ans by M. O. Buetow, 1931 University Ave., Paul, skim-milk spray drying plant, over 50,000.

N. J., Garwood—FOUNDRY—Aluminum Co. America, South Ave., 1 story, brick, foundry ldg. $45,000.

N. J., Newark—PLANT—Celanese Corp. of merica, 90 Ferry St., 1 story brick buffing ldg.

Pa., Donora—MILL—American Steel & Wire R. H. Broden, mgr., Pittsburgh Dist., rick Bldg., Pittsburgh, brick, steel, con-ete, steel and wire mill addn. G. H. Rose, ockefeller Bldg., Cleveland, O., co. ch. engr. W. Dennis, works engr.

R. I., Central Falls—FACTORY—General roducts Co., 36 Hadwin St., plans by Dwight ubury Co., 188 Main St., Pawtucket, 2 story, rick factory. $40,000.

Tex., Baytown — COOLING TOWERS — umble Oil & Refining Co., 2 cooling towers refinery plant. $100,000.

Tex., Baytown—PLANT—Humble Oil & efining Co., repairing, imprv. Toluol plant amaged by hurricane.

Tex., Houston (at Deere Park)—RE-INERY, etc.—Shell Oil Co., Deere Park, re-iring, imprv. large oil refinery and synthetic ubber plant. Over $40,000.

Tex., Snyder—COTTON GIN PLANTS—A. Erwin, W. E. Holcomb and N. W. West, mprv. 5 existing cotton gin plants here and djacent towns.

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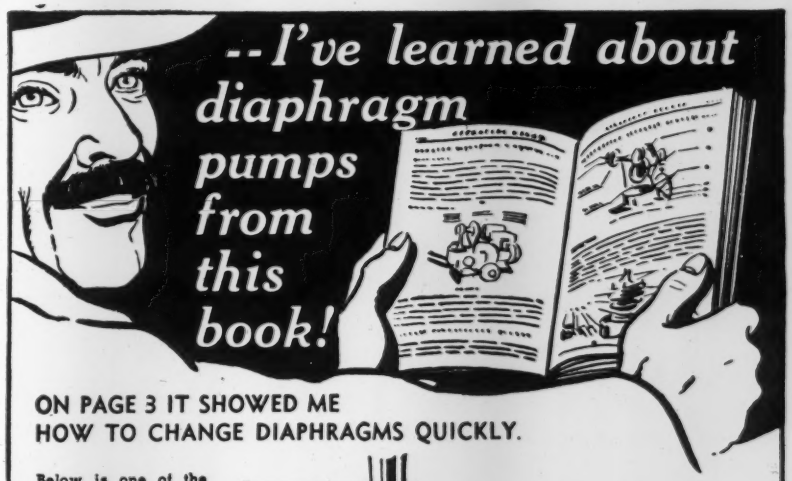
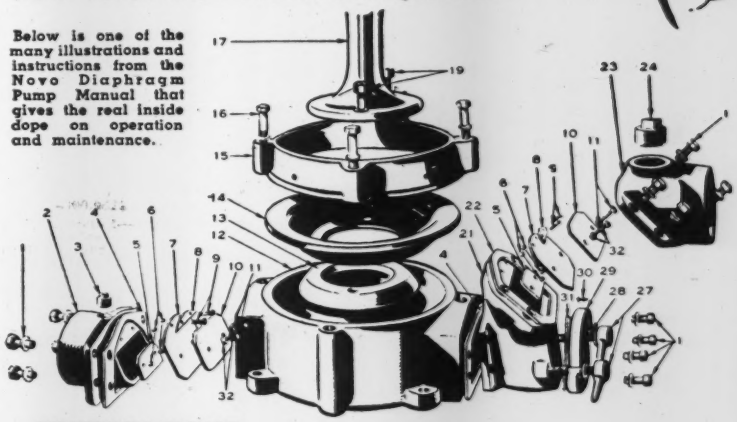


ON PAGE 3 IT SHOWED ME HOW TO CHANGE DIAPHRAGMS QUICKLY.

Below is one of the many illustrations and instructions from the Novo Diaphragm Pump Manual that gives the real inside dope on operation and maintenance.



DIAPHRAGM CHANGE

The pump is so designed as to make replacement of the diaphragm an easy job. Simply remove the eccentric brace on suction side of pump, then remove the four cap screws (16) holding the pump top (15). With eccentric at upper dead center swing the crosshead (17) out. Then remove the two nuts (19) which clamp the crosshead to the plunger bottom casting (13). Swing the top (15) over the crosshead. Remove old diaphragm (14) and insert new one in place bolting diaphragm between crosshead (17) and plunger bottom (13). Bring top casting (15) down to position on diaphragm, with eccentric at LOWER DEAD CENTER, making certain diaphragm is centered on pump base (12), then replace the eccentric brace and the four bolts (16) of pump top (15) drawing down evenly all around and the pump is again ready for service.

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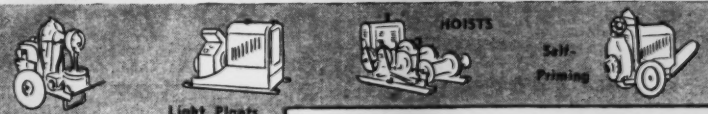
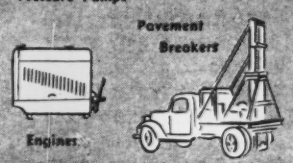


Diaphragm and Pressure Pumps

Light Plants



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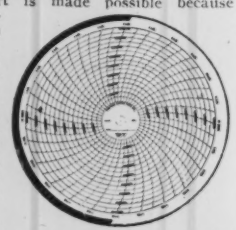

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Tex., Texas City—PUMPING STATIONS—Gulf Oil Co., Gulf Bldg., Houston, imprv. 5 oil pumping stations. Over $40,000.

Wash., Bingen—FACTORY, etc.—Norby Box & Lumber Co., reconstruction of box factory and planing mill destroyed by fire, $50,000.

BIDS ASKED

Bids Asked August 16

Pa., Sharon—POWER HOUSE—Westinghouse Electric & Mfg. Co., Geo. H. Parkman, dir. building construction, Maloney Bldg., Pittsburgh, 100x104 ft. brick, steel, rein.-con. power house, 80 ft. high, Sharpsville Ave. H. L. Heilman, co. ch. engr.

CONTRACTS AWARDED

Calif., Oakland — FACTORY — Pittsburgh Equitable Meter Co., Merlo-Nordstrom Div., 2431 Peralta St., Oakland, factory addn., to Christensen & Lyons, 3454 Harland St., San Francisco, Est. **$40,000**, A. Froberg, 3454 Harlan St., Oakland, archt.

Va., Richmond—PLANT—Kingan & Co., H. H. McVey, mgr., 2 story, bsmnt., sub-bsmnt., brick, rein.-con. plant addn., to Claiborne & Taylor, 117 South Second St., **$300,000**. Corneal, Johnston & Wright, Atlantic Life Bldg., archts.

Conn., Shelton—FACTORY—Mullite Refractories Co., M. Fyfe, Canal St., factory Canal street to E. & F. Construction Co., 94 Wells St., Bridgeport, Est. **$45,000**. Fletcher Thompson Inc., 211 State St., Bridgeport, engr.

Conn., Stamford—PLANT—Yale & Towne Mfg. Co., 200 Henry St., 1 story, 57x120 ft., brick plant addn., Pacific St., to Vuono Constr. Co., 217 Bedford St. CD 7/16—ENR 7/22.

Delaware — LABORATORY — Atlas Powder Co., 904 Market St., Wilmington, research laboratory, to Turner Constr. Co., 420 Lexington Ave., New York. Est. **$150,000.**

Md., Baltimore—PLANT—Dupont de Nemours Co., Wilmington, Del., soda dissolving plant, incl. loading bridge, storage tank fdn., stairs, platforms, to Consolidated Engr. Co., 20 E. Franklin St., Baltimore.

N. J., Elizabeth—PLANT—General Instrument Co., 829 Newark Ave., altering plant, to Salmond-Scrimshaw Constr. Co., 526 Elm St., Arlington, **$40,000**, John & Wilson Ely, 744 Broad St., Newark, archts.

N. J., Hoboken—BOILER HOUSE—Bethlehem Steel Co., foot 14 St., boiler house superstructure to J. W. Ferguson, 152 Market St., Paterson, **$50,000**. Lockwood-Greene, 10 Rockefeller Plaza, New York, N. Y., engrs. and archts. CD 7/19—ENR 7/22.

Pa., Coraopolis—PLANT—Pittsburgh Forgings Co., Gulf Bldg., Pittsburgh, 2 story, 23x107 ft. brick, rein.-con. tool storage and locker room bldg., to David T. Riffle, 1006-8 Forbes St., Pittsburgh. Est. **$50,000**. Janssen & Cocken, 800 Century Bldg., Pittsburgh, archt. S. B. Davidson, Coraopolis, co. ch. engr.

Tex., Edinburg — REFINERY — McBride Refining Co., mfg. 91 octane aviation gasoline refinery unit, Force Account, **$90,000.** CD 5/7—ENR 5/13.

Tex., Hillsboro—PUMPING PLANT—Stanolind Pipe Line Co., Fair Bldg., Fort Worth, crude oil pumping plant expansion, imprvs., force account, approx. **$100,000.** CD 7/29.

Wis., Iron Ridge—WAREHOUSE, etc.—Iron Ridge Cooperative, Iron Ridge, 2 story, 40x72 ft. concrete block warehouse and service bldg., concrete fdn., to Rohde-Kapelle Co., Mayville. A. Kuenzi, 202 N. Water St., Watertown, engr.

Wis., Kaukauna — FACTORY — Kaukauna Machine Corp., Kaukauna, 1 story, 52x82 ft. concrete block factory addn., concrete fdn., to Hennes & Glaff Constr. Co., Kaukauna. E. A. Wettengel, 116 S. Pierce Ave., archt.

Proposal Advertisements see p. 207-208
Postwar Projects see p. 182

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OFFICIAL PROPOSALS

Bids: August 24, 1943 (165)

Chemical Equipment

SOUTH DISTRICT FILTRATION PLANT
DEPARTMENT OF PUBLIC WORKS
CITY OF CHICAGO
CHICAGO, August 4, 1943.

SEALED PROPOSALS will be received by the City of Chicago until 11 A. M. (Central War Time) Tuesday, August 24, 1943, at Room 406 City Hall, at which time and place all such proposals will be opened publicly and read for furnishing, delivering and installing Chemical Equipment for the South District Filtration Plant, located in the vicinity of East 79th Street and Lake Michigan, Chicago, Illinois, according to plans and specifications on file in the office of the Department of Public Works of said City, Room 406 City Hall.

The work to be done includes furnishing, delivering and installing, Dry Chemical Feed Equipment, Lime Slakers, Chlorinating Equipment, Weigh Hoppers and Gates, Scales, Chemical and Chemical Solution Tanks and Appurtenances, Pneumatic Unloading and Dust Collecting Equipment, Screw Conveyors and Appurtenances, Piping, Small Pumps and Miscellaneous Equipment.

Proposals must be made out upon blanks furnished at said office of the Department of Public Works and be addressed to said Department, indorsed, "Proposal for Chemical Equipment, South District Filtration Plant" and be accompanied by a deposit in an amount equal to five per cent (5%) of the total amount bid (but not less than One Hundred Dollars ($100.00) in money or a certified check for the same amount on some responsible bank located and doing business in the City of Chicago and made payable to the order of the Commissioner of Public Works.

Plans and specifications may be obtained upon payment of Twenty-five Dollars ($25.00) for each set, which will be refunded upon the return of said plans and specifications in good condition within thirty (30) days after the opening of bids. Deposits to be in the form of money or certified check.

In accordance with the provisions of the Act of the General Assembly of the State of Illinois, entitled "An Act regulating wages of laborers, mechanics and other workmen employed under contracts for public works," approved June 26, 1941, the general prevailing wage rates for work at the construction site are set forth in the specifications.

The Commissioner of Public Works reserves the right to reject any or all bids.

No proposal will be considered unless the party submitting the same shall furnish evidence, satisfactory to the Commissioner of Public Works, of ability, and the possession of the necessary facilities, together with sufficient pecuniary resources, to fulfill the conditions of the contract and specifications.

OSCAR E. HEWITT
Commissioner of Public Works

Bids: August 16, 1943 (162)

Storm Sewer and Drainage Structures

FEDERAL WORKS AGENCY
PROJECT NO. R. I. 37-150
CITY OF NEWPORT, RHODE ISLAND

Separate Sealed Bids for the Paving of Maple Avenue from Girard Avenue, to the Corporate Limits of the City of Newport, Rhode Island, including Storm Water Sewer and Storm Drainage Structures, will be received by the Board of Aldermen of the City of Newport at the Office of the City Clerk until Three o'clock P. M., Eastern War Time, August 16, 1943, and then at a Meeting of the Board of Aldermen in the Aldermanic Chambers at Four o'clock P. M., Eastern War Time of the Same Day, publicly Opened and Read aloud.

The Information for Bidders, Form of Bid, Form of Contract, Plans, Specifications, and Forms of Bid Bond and Performance Bond may be examined at the Office of The Commissioner of Public Works, City Hall, Newport, Rhode Island, and Copies thereof obtained upon Payment of $25.00 for each Set. Any Bidder, upon returning such Set promptly and in good condition, will be refunded his Payment, and any Non-Bidder upon so returning such a Set will be refunded $20.00. The Board of Aldermen, acting for the City of Newport reserves the Right to Waive any Informalities in, or to Reject Any or All Bids.

Each Bidder must deposit with his Bid Security in the amount of $700.00 in the Form and subject to the Conditions provided in the Information for Bidders.

Attention of Bidder is particularly called to the requirements as to Conditions of Employment to be observed and Wage Rates to be paid under the Contract.

No Bidder may withdraw his Bid within Five days after the actual Date of the Opening thereof.

Henry B. Whalen
City Clerk

Bids: August 24, 1943 (164)

Rapid and Slow Mixers

SOUTH DISTRICT FILTRATION PLANT
DEPARTMENT OF PUBLIC WORKS
CITY OF CHICAGO
CHICAGO, August 4, 1943.

SEALED PROPOSALS will be received by the City of Chicago until 11 A. M. (Central War Time) Tuesday, August 24, 1943, at Room 406 City Hall, at which time and place all such proposals will be opened publicly and read, for fabricating, furnishing, delivering and erecting, at the South District Filtration Plant, located in the vicinity of East 79th Street and Lake Michigan, Chicago, Illinois, 36 Slow Mixers to be installed in the mixing basins. 3 Rapid Mixers to be installed in the chemical mixing conduits according to plans and specifications on file in the office of the Department of Public Works of said City Room 406 City Hall.

Proposals must be made out upon blanks furnished at said office of the Department of Public Works and be addressed to said Department, indorsed, "Proposal for Rapid and Slow Mixers, South District Filtration Plant" and be accompanied by a deposit of Five Thousand Dollars ($5,000.00) in money or a certified check for the same amount on some responsible bank located and doing business in the City of Chicago and made payable to the order of the Commissioner of Public Works.

In accordance with the provisions of the Act of the General Assembly of the State of Illinois entitled "An Act regulating wages of laborers, mechanics and other workmen employed under contracts for public works," approved June 26, 1941, the general prevailing wage rates for work at the construction site are set forth in the specifications.

The Commissioner of Public Works reserves the right to reject any or all bids.

No proposal will be considered unless the party submitting the same shall furnish evidence, satisfactory to the Commissioner of Public Works, of ability, and the possession of the necessary facilities, together with sufficient pecuniary resources to fulfill the conditions of the contract and specifications.

OSCAR E. HEWITT
Commissioner of Public Works

(Additional Proposal Advertising Continued on Page 208)

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Bids: August 23, 1943 (163)

FEDERAL WORKS AGENCY
101 PARK AVENUE
NEW YORK, 17, N. Y.
PROJECT NO. Pa. 36-197

Sealed bids subject to the conditions contained herein will be received until 2:00 P.M., E.W.T., August 23rd, 1943, at the office of the Federal Works Agency, 101 Park Avenue, New York, 17, N. Y., and there publicly opened and read aloud *for furnishing all labor and materials for the construction of 7½2 L.F. of 8" sanitary sewer and 6½0 L.F. of 12", 15" and 18" storm sewer lines* on Gregory Street and Monaca Road, Aliquippa, Pennsylvania. Copies of plans and specifications and other contract documents are on file and open to public inspection at the office of John M. Gallagher, Regional Director, Region No. 1, Federal Works Agency, 101 Park Avenue, New York, N. Y. Where copies of plans and specifications are requested they may be obtained from the above office or from the Federal Works Agency Field Office at the Rochester Hospital, Rochester, Pa., a deposit of Fifteen ($15.00) in the form of a certified check, or money order payable to the Treasurer of the United States of America, will be required to insure their return. Bidders upon the return of plans in good condition within ten (10) days after date of bid opening, will be refunded their full deposit and any non-bidder upon so returning such plans will be refunded Ten Dollars ($10.00). Guarantee will be required with each bid as follows:—Bid Bond, Money Order, Certified Check or Cashier's Check of not less than five (5%) per cent of the bid made payable to the Treasurer of the United States of America. Performance Bond in the amount of fifty (50%) per cent of the contract price and Payment Bond in the amount of fifty (50%) per cent of the contract price will be required made payable to the Treasurer of the United States of America. Bids must be submitted upon Standard Government Form of Bid and the successful bidder will be required to execute the Standard Government Form of Contract for Construction. The right is reserved as the interest of the Government may require to reject any or all bids, to waive any formality in bids received and to accept or reject any items of any bid, unless such bid is qualified by specific limitations. Envelopes containing bids must be sealed, marked and addressed as follows: John M. Gallagher, Regional Director, Region No. 1, Federal Works Agency, 101 Park Avenue, New York, 17, N. Y., Bid for Sanitary and Storm Sewers, Aliquippa, Penna., FWA Project No. Pa. 36-197, to be opened at 2:00 P. M., E.W.T., August 23, 1943. John M. Gallagher, Regional Director, Region No. 1.
August 5, 1943.

Additional OFFICIAL PROPOSAL Advertisements on page 207

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